RAILROAD GAZETTE

FRIDAY, OCTOBER 16.

The Lawson Boiler.

The method advocated by Mr. Lawson for the prevention of boiler explosions is open to considerable criticism, but has attracted much attention, and we therefore lay before our readers the inventor's explanation of his theory, with illustrations of the manner in which he applies his principle to locomotive boilers.

The Lawson theory is that water under certain conditions is a powerful explosive, and that boiler explosions are caused by a sudden reduction of pressure upon the surface of highly heated water, followed by a sudden check to the exploding water, the result of which is an impact or striking blow in excess of the strength of the boiler.

Water under atmospheric pressure becomes steam at 212 Fahr., and in its new state occupies 1,720 times its previous bulk. In a vacuum it rapidly becomes steam at only 70.° Water when heated to the boiling point requires 966° Fahr. additional heat to change it from the state of water to the state of steam. This change is substantially instantaneous at all pressures. As each molecule of water absorbs the last of the 966° it instantly explodes into steam. Water differs from all other explosives in one particular. Only a portion of the water may explode—one molecule, the half, or the whole mass. These various amounts in exploding produce results ranging from violent explosions to mild ruptures and the safe operation of boilers.

The true source of the development of the destructive power in a steam boiler is the sudden liberation and concentration of the sensible heat in the water above 212° (or above 70° in case of a vacuum caused by the condensation of steam) into a part of the molecules of water, passing into them the 966° necessary to change them from the state of water to the state of steam. That the stored heat in a boiler is capable of forming steam is shown by raising a safety valve after the fire has been drawn. Steam will be generated continuously as the pressure is reduced, until the water nearly reaches the atmospheric temperature of 212°. The explosive energy in a steam boiler is measured by the quantity of sensible heat stored in the water between the degree of temperature at which it stands at the moment previous to the sudden reduction of pressure, and the temperature normal to the lowest point of pressure to which it is subjected the instant following the full reduction of such pressure, caused usually by a quick discharge or instantaneous condensation of steam. The sudden reduction of pressure causes a sudden liberation and discharge of a portion of this enforced sensible heat stored in the water.

To illustrate, take a boiler containing 5,000 lbs. of water at a pressure of 150 lbs., and a corresponding temperature of 367°. Suddenly reduce the pressure to 100 lbs. per square inch, under which pressure water explodes at but 340°. There are stored in each of the 5,000 lbs. of water 27° of sensible heat above the exploding point—in the aggregate 135,000 thermal units, enough, if liberated and concentrated, to convert 140 lbs. of this superheated water into steam. In an instant most of these 27° of sensible heat in each pound of water are liberated and absorbed by the molecules of water at the surface and for a considerable depth, and suddenly the molecules making up these 140 lbs. of superheated water, or a considerable portion thereof, start with great rapidity into the state of steam, and when expanded about one-tenth of their expansive capacity come in contact with the shell of the boiler. The result is a concussive force in excess of the strength of the boiler. The shell is torn into shreds, and the whole mass of nascent steam, relieved of all pressure above that of the atmosphere, passes into full steam, occupying 1,720 times the space it did a moment before. A large portion of the water, relieved of pressure, also passes into steam. With an explosion the actual destructive force exerted is not measured by the tensile strength of the boiler nor by the regular pressure of the steam. The force is far in excess of either—an immense concussive force that tears asunder the weak and the strong parts at the same instant.

Writers on steam-boiler explosions in trying to account for their violence have made the mistake of commencing the calculation at a point of time after the rupture has commenced. Rupture is the result of violent internal action at the instant preceding the actual rupture. If the "initial point of rupture" in an explosion is always the weakest point, seams, especially in new boilers, would invariably give way first. Nine boilers in a battery of ten have exploded at the same instant. It would seem irrational to say that each one of these had a like weak spot.

The distinction between rupturing and exploding is often overlooked. When a boiler gives way at a weak point, resulting in damage, it is often erroneously called an explosion. When ruptured by mere pressure, the force exerted upon the shell being gradual and uniform, the weak point yields while the balance remains intact. Serious damage may result, but a uniform and unobstructed flow of steam never produces the phenomenon properly called an "explosion."

Thus it will be seen that there is sufficient destructive power stored in the boiler when thus put in action to cause an explosion. If the reduction of pressure caused by the withdrawal of steam be moderate, and such draught be continuous and uniform there will be no danger; but if the draught is considerable in quantity and instantly checked, the steam thus suddenly formed and checked will give an impact or striking blow upon the shell of the boiler, the aggregate force of which is equal to the weight of the water before it passed into nascent steam multiplied by the square of the velocity with which it strikes, less, however, the resistance of the steam already in the boiler. In working practice explosions usually occur at the instant after turning steam from the boiler into the cylinder, or at the instant when the safety valve is closed after steam has been blown off. They may occur at any time by the sudden condensation of steam in contact with highly heated water in the boiler. In all cases there is a reduction of pressure and a check.

The remedy claimed by Mr. Lawson is the construction of a boiler with a partition plate or diaphragm dividing it into two compartments, the lower containing the water and the upper containing steam only. Two steam gauges are used, one connected with the water space below and one with the steam space above the diaphragm. The steam passes from the lower to the upper compartment through small perforations and small valves in the diaphragm. When the boiler is set for use such valves should be closed. As the steam is generated and the engine put in operation at its full capacity, any additional steam required is obtained by gradually and partially opening such valves until the required amount is liberated and ascertained, when such valves are set and need little further attention. In thus arranging such valves particular attention must be paid to the steam gauges. The valves should be opened only to that extent at which the pressure upon the water in the lower compartment remains uniform with that in the upper, as shown by the gauges, with the engine in full operation. A uniform pressure upon the water is thus maintained, all sudden explosions of any dangerous quantity of water into steam avoided, and any unusual and sudden withdrawal of steam from the upper chamber is attended with no danger.

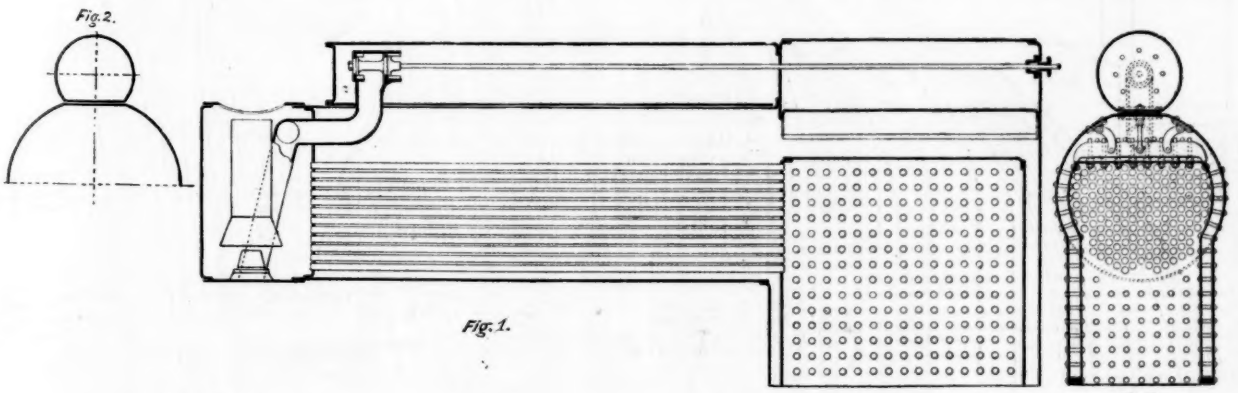
Mr. Lawson claims that his boiler will also give dry steam and prevent incrustation. The true cause of "wet steam" is that a large quantity of steam taken suddenly from a boiler at one point greatly reduces the pressure upon the water immediately under the point of exit, while the full pressure of the steam remains upon the surface of the water at every other point, and the result is that particles of the water are constantly forced out with the steam. In a boiler with the Lawson diaphragm the steam passes from the lower compartment to the upper, not at one point, but in small quantities at many points; and the steam used being taken from the upper compartment, all the concussive force and intermittent pressure and motion are arrested and confined to the upper compartment, the pressure upon the surface of the water is, consequently, uniform, and there is no irregular and violent ebullition.

It is claimed that boilers with the Lawson diaphragm are free from incrustation. Substances held in suspension or solution are separated from the water and steam and deposited upon the diaphragm in a loose condition—where they do not interfere with the generation of steam, and whence they can be readily removed. The water and steam in a boiler have a rapid upward motion, and if this motion is checked, any foreign matter of a greater specific gravity is dropped. In the Lawson boiler the steam passes with great velocity through the small orifices in the diaphragm, and is checked when it is discharged into the upper compartment, dropping the sediment on the diaphragm.

It is therefore claimed that with the Lawson boiler high pressure is secured with greater safety, the danger of explosion avoided, dry steam obtained and all incrustation prevented.

The accompanying illustrations, Figs. 1 to 5, show the application of the Lawson invention to locomotive boilers of different types as designed by the Lawson Non-Explosive Boiler Co., of 155 Broadway, New York.

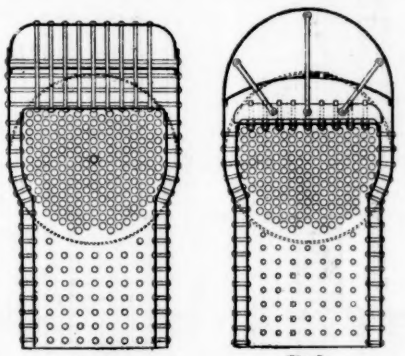
Figs. 1, 2 and 5 illustrate the "Wagon Top" style, both ends of wagon top perpendicular, and a supplemental steam chamber on top of the barrel of the boiler, butted up to the front end of the wagon top. Fig. 1 is a longitudinal section; fig. 5 is a transverse section through the fire-box; fig. 2 is a



THE LAWSON BOILER.

partial transverse section through the barrel of the boiler and supplemental steam chamber. This style may be constructed either with or without the supplemental steam chamber shown in fig. 2; fig. 3 is a transverse section through a flush top fire-box, with a supplemental steam chamber extending the whole length of the boiler, and fig. 4 is a transverse section through a Belpaire fire-box.

The radical difference from the locomotive boilers in use is the horizontal division of the steam space into two compartments; the steam passing from the lower or water compartment through 100 perforations ¼ in. in diameter, and 13 valve orifices 2-in. in diameter to the upper one for use. The aggregate area of the steam passages is regulated by valves closing the 2-in. orifices and the use of two steam gauges, one gauge connected with the upper steam space, and the other one with the lower or water compartment. This division is made in figs. 1, 2, 3 and 5 by a diaphragm located above the crown sheet, and in the flat part of the top of the boiler and the flat part of the bottom of the supplemental steam chamber, where they are joined together, and in fig. 3 by the flat parts of the boiler and the supplemental steam chamber. No dome or dry pipe need be used. The steam pipe starts at the front end of the supplemental steam chamber or wagon top, where the throttle valve is located, and ends at the usual point. The locomotive in other respects is constructed as usual.



THE LAWSON BOILER.

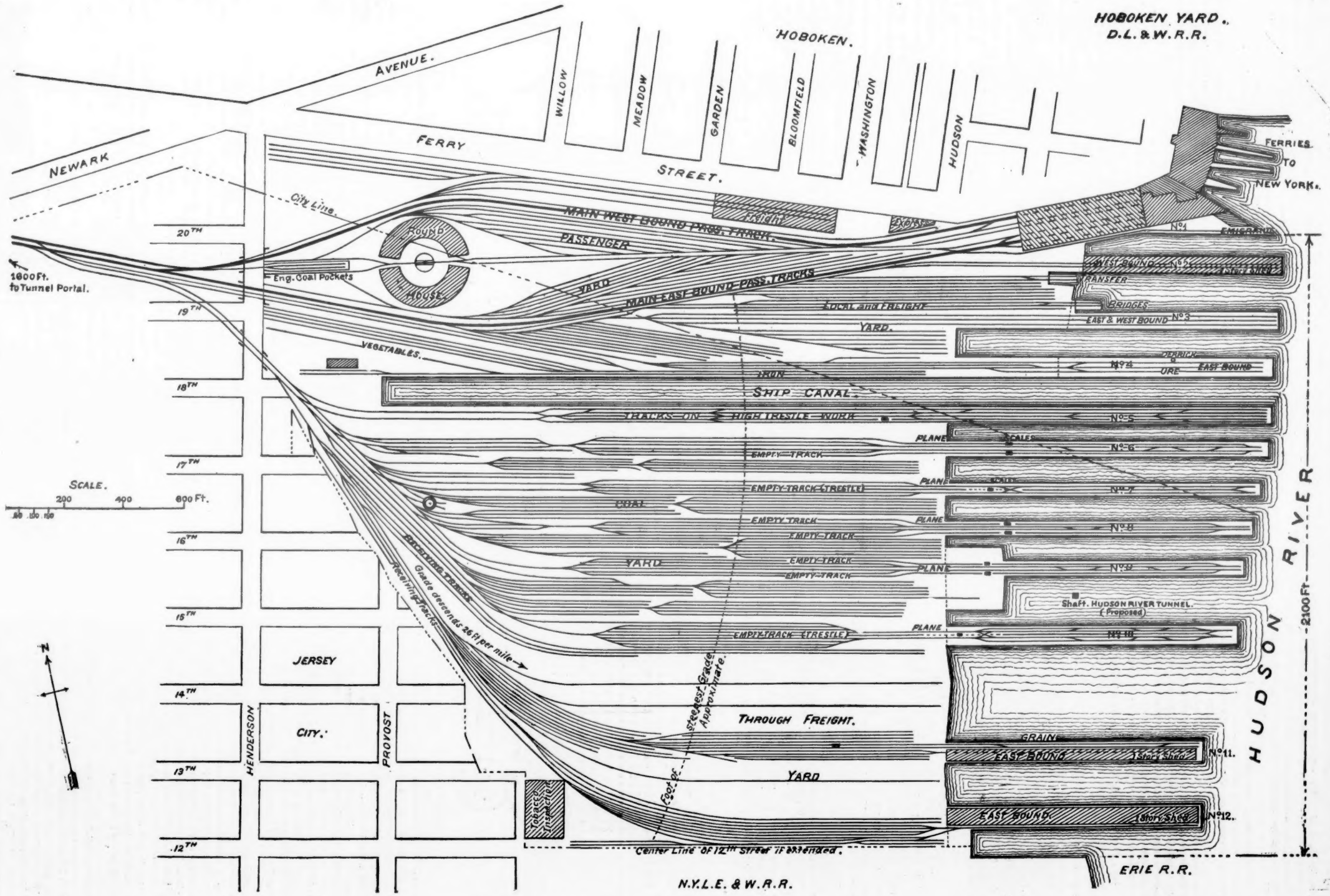
New York Terminal Works and Business of the Delaware, Lackawanna & Western Railroad.

Although the principal business of this company is the transportation of anthracite coal from the Lackawanna district of the Pennsylvania coal fields, it has necessarily enlarged the character of its business by the building of an independent double-track road to Buffalo, where it makes a Western connection to Chicago, principally over the New York, Chicago & St. Louis Railway.

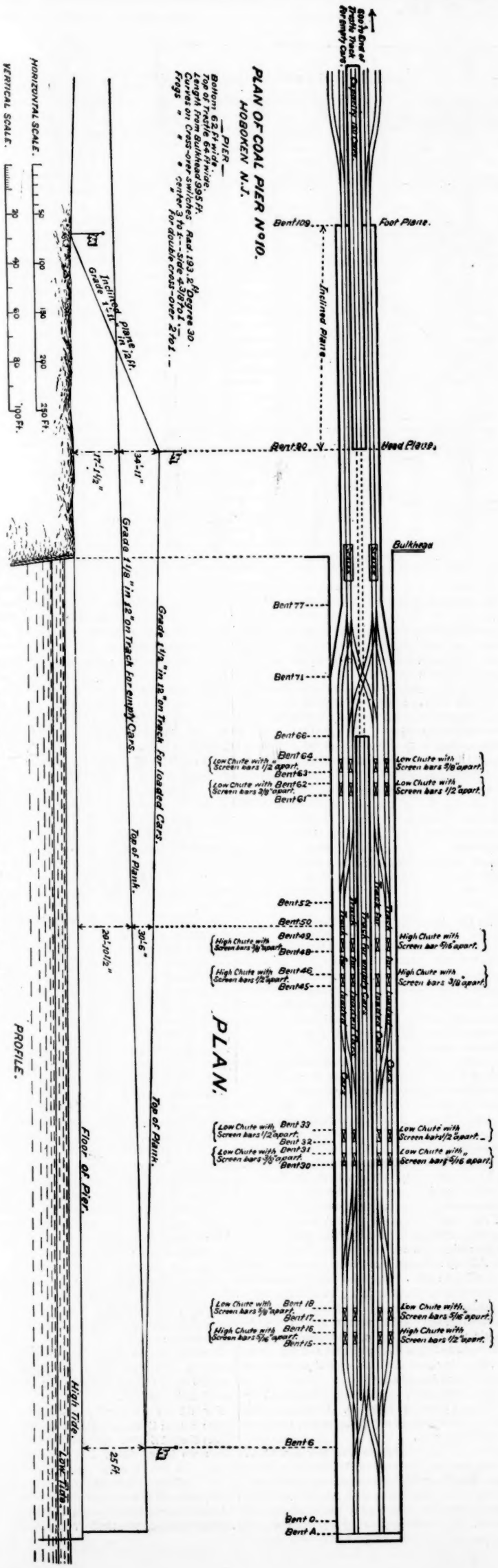
It operates also a line to Oswego, on Lake Ontario, and over that and several other branches has direct connections to some of the rich and fertile districts of the central part of the state of New York.

It remains, however, in its operation, simply a transportation company, and its business terminates in Hoboken, at the station on the west bank of the Hudson River (shown in Fig. 1), lying opposite Christopher street, New York, which is about 2¼ miles north of the Battery.

The handling of miscellaneous freight at this station, the lighterage to and from New York, and the handling in the



HOBOKEN YARD—DELAWARE, LACKAWANNA & WESTERN RAILROAD.



city are all done under a contract with a private firm; hence, in addition to the necessary work of moving cars in the yard, the principal work done directly by this company is the handling of the coal.

Like the Pennsylvania and Erie railroads, it has a yard on the Hackensack meadows (called the Secaucus yard), but i is not an important one; being simply a few tracks parallo to the main tracks, making in all about six miles of sidings.

Running eastward from this yard the grade ascends to the tunnel through Bergen Hill, which is entered at about the same point as the Erie Railroad, but ona considerably higher level and in a more northerly direction. The eastern portal is only 1,600 ft. from the beginning of the terminal yard, and as the grade is high, all the city streets are crossed overhead on substantial iron bridges.

The northern part of the yard, above the ship canal, is devoted to the passenger, local freight and iron business, and is now being rebuilt according to the plan shown. There are about 36 acres in this part of the yard, and 20 miles of track, of which 9 miles are devoted to the passenger, and 11 miles to the freight business. Five engines with crews are employed in the latter business during the day and two at night, moving from 125 to 200 cars a day each way.

The southern part of the yard, below the ship canal, is newly built, regularly graded, and all the tracks are in excellent line and surface and of new material. There are about 58 acres in this part of the yard back of the bulkhead line and 33 miles of track, of which 6 miles are used for the through freight business and 27 miles for the coal business.

The coal is hauled generally in small dump cars, each of which occupies about 13 ft. in length in a train, weighs about 7,500 lbs. and carries about 12,000 lbs. of coal. Gondola cars with hoppers are also used. Each occupies 28 ft. in length in a train, weighs 20,000 lbs. and carries 40,000 lbs. of coal. The east-bound road engine hauls 100 of the smaller cars in a train to Secaucus yard, and the train is there divided, 60 being hauled through the tunnel by the road engine and 40 by a "tunnel" engine. On entering the yard the engine cuts loose and the cars are run by gravity down the grade on the receiving tracks, while the engines are turned on the turntable *A* and haul empty cars back. The in-bound loaded cars are immediately inspected, the boxes filled and the date of arrival marked with white chalk on each car. The yard engine then hauls them up the grade, and with the grade descending in the direction of the work, sorts the cars.

On Pier 5, which runs by the side of the long ship canal, is a high-level trestle-work, on which the tracks run on about a level grade from the Henderson street bridge. The coal is run from the cars directly to the vessels, or dumped on the pier for "stock," as required. It is devoted to the coal business of the New York, Susquehanna & Western Railroad.

Piers 6, 7, 8, 9 and 10 are built on a plan similar to that indicated in Figs. 2 and 3. The cars are hoisted by machinery up a steep inclined plane from the tracks in the yard to the top of the elevated trestle-work on the piers, the coal dumped into the bins and thence into the vessels, and the empty cars run back down a longer inclined trestle-work track into the yard. These "empty" tracks are sometimes in the centre and sometimes on the side of the pier. Pier No. 10 is the newest and best arranged.

Piers Nos. 6, 7, 8 and 9 are devoted to the business of the agents of different mines, generally two or three consignees on each pier. Each one of these consignees keeps his stock separate, and sells independently the coal from the different mines, making in all some 30 consignments. Consequently, the coal from each must be separated in the yard, and each mine ships several different sizes of coal, which also must be put together so as to operate the piers regularly and systematically. Hence the yard for each pier is admirably designed for this work, being divided into a series of small yards as shown.

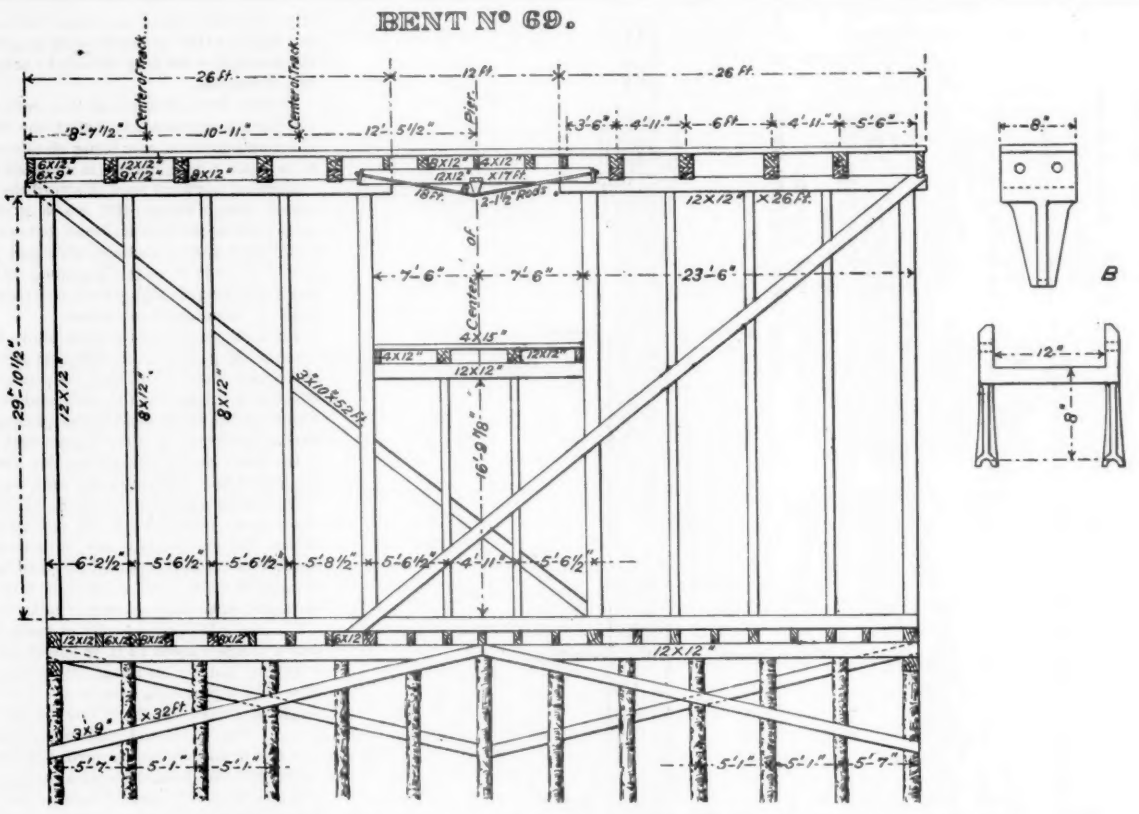
The plan of the yard of Pier No. 10 indicates a different arrangement of business. The coal handled in this pier is mined entirely by the Scranton Coal Co., which classes the product of all its mines alike and does not sell each separately. Therefore, the sorting of this coal is simply the necessary separation of the different sizes, which is done at Port Morris yard, which is some 30 miles west. Hence, the trains arrive in the Hoboken yard assorted in sizes, and the only yard work needed is to place the cars so that they can he hauled up on the plane. In winter two of the small cars (in summer generally three) are hooked by a chain to a link in a wire cable of 1¼ in. diameter, which runs over sheave-wheels at the bottom and top of the plane and thence to the drum. Both drums—one under each track—are on the same shaft and run in the same direction, but, the cables being wound in opposite directions, the cars are raised on one plane at a time.

All the planes are furnished with one pair of "dogs" for each bent. There are two sticks of timber hung on a heavy round-iron bar running across the plane and inserted in the stringers. The long end of the dog below this bar rests in the cap below, while the short upper end extends just far enough to catch the car axles. As the car passes up the plane, the axle runs along the upper edge of the dog which revolves on its own axis and allows the car to pass over it, but as soon as each car-axle leaves, it assumes its regular position, and if an accident occurs catches the axle of the car and prevents it from running down the plane.

The drum-shaft is geared directly to the driving-shaft of a pair of 16 × 30 in. cylinder horizontal engines, which (with the boilers) are operated by one man and use about 1½ tons of coal in a day of 10 hours.

The loaded cars on arriving at the head of the plane immediately pass over the scales and are weighed; and the tracks are so well arranged that they can be placed without trouble at any bin on the pier.

The bins are located as shown on the plan. They are lined



COAL TRESTLE BENT—DELAWARE, LACKAWANNA & WESTERN RAILROAD HOBOKEN YARD.

with sheet iron, and receive the coal as it is dumped from the cars. From the bins the coal runs over the bar screen (the sizes of which are given), and thence over the iron apron into the vessel. The aprons are hinged at the end next the trestle-work, and are raised and lowered by means of chains running to an ordinary hand-drum gearing at the top. The dust and screenings are wheeled back on the pier and shipped separately. The bins are of different sizes, and the aprons at different heights, in order to accommodate the different kinds of vessels. The sailing vessels which run to Boston and other points on the coast, carry from 700 to 800 tons, and the coal is run into them and larger vessels, when they are empty, from the high bins.

The coal for the city is carried in canal boats of 230 to 250 tons capacity, and to load them the larger and lower bins are used. These latter bins will hold 50 tons, and hence the movement of the cars need not wait on the "trimming" and movement of the boats. None of the bins, however, are intended for permanent storage.

The work of dumping and moving the cars on the piers is done by men employed by the railroad company; 3,000 tons can be regularly handled on Pier 10 each day of 10 hours, with 35 laborers, there being little shoveling required, either with the gondola hopper cars or the the small dump cars.

At the end of Pier No. 10 is a coaling station for tug-boats. The coal is dumped on the pier and delivered to the boats by a contrivance worthy of notice. It is a small car carrying a sheet-iron hopper holding about a ton of coal, which is weighed on scales rigged on the car itself. By this means the coal, wherever it may be, is weighed on the car, which is run on a track to the boat. Its possible application to the following work is the cause of its being noted here.

Commercially speaking, the coal trade is most active in the spring and fall of the year; in summer the coal is not so readily sold, but it is the best season of the year for its mining. Therefore much more arrives at the docks then than is shipped from them, and consequently the surplus must be stocked. This is done in great piles running back 400 ft. from the bulkhead and 25 ft. high. When this coal is shipped in the fall the boats lie at the bulkhead and the coal is screened by hand and wheeled to the boats by wheelbarrows. Each wheelbarrow delivers 224 lbs. of coal, and the load of each barrow is weighed and corrected on a small platform scale placed wherever it may be convenient.

It is evident that the principal advantage in cost of operating that a coal-carrying road has over a road doing a general business, is in the handling of its freight; for while in practice, the apparent proportion of paying to dead load per car is much greater with a coal car than with a merchandise car—perhaps twice as greater—still the coal car is always hauled back empty, and although its work is more regular and prompt, as it returns against the grade the practical proportion of paying to dead load is probably diminished to nearly the same ratio as with cars for merchandise and general freight. GRATZ MORDECAI.

Contributions.

The Manufacture of Sparks.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The following instance of a large output of sparks came under my notice lately, and may be interesting to some of your readers, and serve the purpose of a shocking example, showing that the extension front is not invariably an efficient spark-arrester.

On a Western road recently an extension was arranged with fine nettings and low baffle-plate to catch all of the sparks. This necessitated cleaning the front end every 20 miles or less. In a trip of 180 miles 126 bushels of sparks were run out of the extension, weighing 45 lbs. per bushel or 5,670 lbs. The engine averaged 60 lbs. of coal per mile, or 10,800 lbs. for the trip, and although she was a 17 × 24, with 3¼ nozzles, over half of the fuel was drawn through the flues in the shape of sparks, which, while they may not have had the value of the coal as fuel, were valuable, inasmuch as they burned readily in a blacksmith's fire. With the ordinary extension it is not uncommon to run an engine 200 and 300 miles with but one cleaning of the extension—which is the result of using coarse netting, ½ in. mesh. At the end of the trip the extension is cleaned of its contents—about eight or ten bushels. As the engine, as has been shown, drew 126 bushels through the flues, it follows that the ordinary extension saves about ten bushels and throws out 116 bushels in 180 miles.

VERAX.

The Origin of Coupon Tickets.

WAVERLY, Va., Oct. 8, 1885.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I would inquire through your valuable paper who first introduced the coupon tickets so universally used at the present day. They are as familiar as if they had always existed, but there must be a beginning to all things, and it might be interesting to know the beginning of coupon tickets.

In 1853 the writer was in charge of the freight and passenger department of the Rutland & Washington Railroad (now run and controlled by the Delaware & Hudson Canal Co.), a new road opened in 1852, and in 1853 operated in connection with the Albany Northern Railroad. The connection was made at Eagle Bridge, N. Y., and it formed a line from Rutland, Vt., to Albany, N. Y. This was previous to any all-rail connection made through to Chicago, but in the latter part of that year a through rail connection was made.

At Rutland, Vt., we had a connection with the Rutland & Burlington Railroad, which gave us a through line from Boston. Although we were a north and south line between New York and Montreal, I thought I could make an east and west line from New England to the West which would secure some of the emigration which was then flowing west. The Boston & Albany Railroad was the only outlet at that time and secured all the traffic. Our line would be some 30 miles longer, but having good connections, we decided to try and build up a business.

A coupon ticket suggested itself to me as a good means to advertise the route, and one offering a convenient and safe way for the passenger to buy a through ticket and save any further trouble, knowing just the cost of his journey and securing him against any imposition.

I drew up a plan for a ticket, and had samples printed by Mr. Tuttle, of Rutland (now Tuttle & Co.). I had never seen anything of the kind or known of any being in use, and have never since learned there was.

With my samples I went to Buffalo and saw Mr. C. C. Dennis, Superintendent and Engineer of the Lake Shore road at that time and for a long time thereafter, and well known in railroad circles. Mr. Dennis was well pleased with the plan, and offered to make the tickets good west of him as fast as new lines opened. The line through to Chicago was not complete between Cleveland and Toledo, but would be complete in a few weeks. Mr. Dennis' kind offer relieved me of going further to arrange for the reception of my tickets.

I returned home and got out my stock of tickets to all principal points from Rutland west to Chicago, and had them ready in time to begin sales when the line was complete. I placed our tickets at principal stations in New England, especially in Boston, they selling a card ticket to Rutland and then using ours west. After the first month's sales, we paid the next month to roads west about $2,000, and the traffic gradually increased.

At first our friends of the Boston & Albany road gave little attention to it, only ridiculed the idea of making our line a western route, but before a year had passed they began to feel a little alarm and finally influenced the management of the New York Central to discontinue receiving our coupons. To obviate that I had a friend in Mr. Chauncey Vibbard, the Superintendent, who provided us with their card ticket, and we put them in the hands of our conductors, who took up the New York Central coupons and gave the passenger the New York Central card ticket instead. Then we were all right again.

We found that persons were going west to visit friends and returning, and that there was a traffic east as well as west. I then sent an agent west who succeeded in getting the Western roads to issue tickets over our line, and Eastern roads about that time began to issue their own tickets, until the system became general, and before I left the Rutland & Washington we were ticketing to St. Paul and all points West as far as roads were built.

The ticket I first issued was a longer ticket than the present style, as the coupon was printed lengthwise. My first plan was to cut between each coupon, so that the edges would hold them together, and so that each conductor could easily detach his coupon; but standing by when samples were printing, I noticed the dotted lines indicating the division, and suggested that the rule be raised to prick it through, which was done, and made a complete perforation.

In a few years the Great Western Railway was completed, forming a line from Buffalo *via* the Michigan Central. A strong competition sprang up between the Lake Shore and the Great Western routes, and they came into the Eastern states with their own tickets and established agents and paid large commissions, sometimes as high as $3 or $4 on a ticket. Julius Morris represented the North Shore and Wm. Barr the South Shore; both energetic men; and the war was strong. In due time other roads west of them sent on agents, and Rutland became the centre for tickets agents. Then, as now, the competing lines would get together and fix rates, and solemnly bind themselves to strictly live up to rates and commissions fixed, only to break their agreement the next day.

The plan proved to be to our advantage, as it brought us business. We were not in the fight, which was all from Buffalo west, but the struggle for business centred at our terminus in Rutland.

I would like to know if you or any of your readers know of the coupon ticket being used earlier than 1853 in any part of the United States. I know there were none selling West when we issued them, but there might have been in the South. If not, I shall claim their introduction. Before 1853 I had been connected with the Central Vermont Railroad, and sold tickets from Burlington, Vt., to Boston, Lowell, and other principal points, but that was a card ticket, and a settlement was made from reports. J. WILDER.

Mark's Automatic Car Coupler: Explanatory.

CLEVELAND, O., Oct. 8, 1885.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your editorial in the issue of the *Railroad Gazette* of Oct. 2, you make the statement that among the car couplers receiving official recognition for the first time is the Mark's.

I wish to correct this, and to inform your large circle of readers that the Mark automatic car coupler at Darlington, England, in October, 1882, competed successfully with all the leading automatic car couplers of the world, receiving the very highest award, a medal and diploma, over all. In this competition were entered the Janney, Excelsior, and many others from the United States.

In your description of the twelve couplers recommended by the Executive Committee of the Car-Builders' Association, at Buffalo, you class the Mark as similar to the Archer. This is wrong. In Mark coupler no spring is used, it being coupled entirely by gravity, which makes it more automatic than any other coupler, for the reason that the link is always straight and thereby insures a perfect and sure coupling every time. Too much importance cannot be placed upon this, as it requires no "link controller" to put it in position, and it is of great and decided advantage to trainmen in coupling with cars of different heights. C. E. MARK,

Superintendent Mark's Automatic Car Coupler Co.

[Our article took cognizance only of American tests. In our classification we adopted that of the committee of the Master Car-Builders' Association in charge of the tests.—EDITOR RAILROAD GAZETTE.]

The Barnes Coupler at Buffalo.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Permit me to congratulate you on your very superior presentation to the public of the coupler tests at Buffalo. In Table II. in your issue of Sept. 25, giving the results of the car-coupler tests at Buffalo, you state of the Barnes "Draft bolt broke." The bolt that did give way was one of four that hold up the plate that holds up the draw-head, and its fracture was caused by the great shock, which drove the draw-bar back. It is no part of our coupler, and is on every car, and did not affect us in any way. We coupled, and we have never failed at any time or any place. LUCIEN BARNES.

The Demand for Railroad Materials and Supplies.

In order to ascertain as nearly as possible the actual condition of the trade in railroad materials, supplies and manufactures, we sent a circular to nearly all establishments of whose existence we are aware which are engaged in the manufacture or sale of such supplies, asking for a statement of the present demand as shown by orders on hand and by inquiries compared with this time last year and the first half of this year; for the prices as compared with last year and their present tendency; and for opinions as to the prospects of the particular business answering. We have received a great many replies to this circular, and many of the more important establishments especially have answered quite fully. We summarize them below.

Locomotive Works.—Shops having the larger part of the capacity have reported. An abstract of the statements of some of them is as follows:

One works, which sells in all parts of the country, reports that there is little difference between the demand now and a year ago, or the first half of this year. It has rather fewer orders now than previously, but has perhaps been better employed than most works. The foreign orders have been larger than usual. There has not been much change in the number of inquiries, except that for a week or two there have been more than usual. Prices have been stationary for a year—lower rather than higher; but they talk higher prices now. See no indication of a marked improvement at present, but expect orders for locomotives for special service.

Another works reports that its orders for the year ending with September last were but three-eighths of its orders for the previous year; that it has very few orders on hand, and that it looks for an improvement in 12 to 18 months. There has been little change in prices.

A third has gone out of the business till prices are higher; there has been no change in these nor will there be till certain shops are full of work or get tired of building engines at a loss.

A fourth has had few inquiries either this year or last, finds prices lower than a year ago, and does not find the prospect better than it was.

A fifth finds the demand the same as for a year back. There is no increase in inquiries; prices are slightly lower, and show no tendency to change. Suspects the demand will not be enough for a year to come to make prices remunerative.

A sixth has no orders now, while it was fully employed a year ago. There are fewer inquiries now than then. Prices are below cost, and this establishment will not take work on such terms. "It is to be feared that the railroads will delay placing their orders so long that they will all come into the market together, and cause an advance in prices similar to that of the last boom, which would be unfortunate for all. They seem to be restricting their purchases to the utmost extent at the present time."

A seventh has the most encouraging report to make. It had 80 per cent. more orders to fill on Oct. 1, 1885, than on Oct. 1, 1884, and has more inquiries. Prices are the same as a year ago. The prospect is more hopeful than for a year past.

Car Works.—Too few of these report to make a basis for a safe judgment as to the condition of the business from the reports alone.

One works, where the pay-roll formerly ran up to nearly $7,000 a month, paid in wages nearly 60 per cent. less in 1884 than in 1883, and for the first eighteen months of this year, one-third less than for the corresponding month of last year. Even in 1883, however, the works had not more than one-half its capacity engaged. The works are now idle and have not a single inquiry. The car which brought $560 last year was sold for $445 this year, and the one that brought $450 last year went for $374 this. Meanwhile the works paid $86 this year for wheels and axles per car, against $95 last year, and for wrought iron 1.7 cents per pound against 1.9. Wages have fallen 10 to 15 per cent. since last year. The prospects for the next quarter seem exceedingly gloomy to these works; for the next year it does not venture a guess. Turn-tables, bridges, etc., made at the same works would be sold now at 10, 15 or 20 per cent. less than the prices of 1884 or 1883.

A Canadian works reports very small orders on hand, and that car-building has been very dull for the last 18 months, and much competition for the few orders. There is not much improvement yet, but some projected railroad extensions may improve the demand next spring. The large companies in Canada build their own rolling stock, which is believed to be uneconomical, especially for freight car work.

A third establishment has more orders than a year ago and more inquiries. Prices are lower now than then, but the tendency is not to go lower. Prospects are better than a year ago.

Large manufacturers of journal-bearings, the consumption of which is more for maintenance than for new cars, have reason to think the consumption of bearings less this year than for many years before. From the appearance of old brasses returned, they judge that the railroads have been wearing the brasses completely out. Roads with the same equipment order fewer brasses. Prices of journals vary with prices of metals, which, with the exception of tin, have been lower than ever before. The only indications of greater activity in business they find are in the newspapers; but they regard the outlook as far from discouraging, as stocks of all kinds of goods are greatly reduced, and to replace them will materially increase the volume of business.

The Allen Paper Car Wheel Co. has all its works running on the same time as last year. Business in the first half of this year was somewhat better than in the last half of last year, and in August last was twice as great as in the same month of last year. There is a marked improvement in inquiries. There has been no change in prices except where exclusive contracts for the use of its wheels are made, when certain rebates are conceded. Advices give evidence of a further increase in business this fall and winter, so much so that the company is materially increasing its facilities to meet the expected demand.

The Paige Car Wheel Co., of Cleveland, did 20 per cent. more business down to Sept. 1 this year than in the corresponding period last year, and inquiries indicate as great an increase for the rest of the year. Prices are about 10 per cent. less than a year ago and no increase is probable this year. Indications, especially since July, are that there will be a gradual improvement.

The Westinghouse Brake Co. finds a very marked improvement in the demand for its goods as compared with a year ago and the first half of this year, particularly for freight-car brakes. Its prices are uniform. Prospects seem very flattering.

Bridge Works.—The King Bridge Co., of Cleveland, O., has had all the work it could do and is now working over time. Business is about the same as in 1883 and 1884; but it does not think this is generally the case. Prices are lower than a year ago. Inquiries for new work are numerous and prospects look favorable.

The Boston Bridge Works has a fair quantity of work on hand, but very much less than a year ago. Inquiries are considerably more numerous than a year ago, but competition is very severe and prices are 8 to 10 per cent. lower than last year at this time. Indications are that there will be a fair amount of business in the market, which will have to be done at a very low price. No immediate prospect of an advance in prices is visible, but they must advance as soon as there is promise of better times in general, because work is now done at a rate no builder will take if he can possibly help it.

Another bridge-builder, who was hardly established and had little work in 1884, has been fully employed this year, and has work for the rest of it, and brilliant prospects for next year. All his friends are full of business. Pays more for skilled labor than ever before.

The Passaic Rolling Mill Co., referring especially to its bridge-work, for the past 18 months has had work on the average for three months ahead, and the same now as last year. Inquiries are not as plentiful as they were last spring. Prices are about 5 per cent. lower than a year ago, but the tendency is to firmness if not to an advance. The works are likely to be busy till January or February in any event, and a decided improvement is expected next spring, unless business is unsettled by an unwise agitation of the tariff question in Congress.

The Detroit Bridge Works has more orders than a year ago, and believes other works are in the same condition. Prices remain about the same, but the tendency is upward. Prospects for the immediate future are brighter. Apparently there is more work to be done and probably at somewhat better prices.

A bridge-building firm which does not manufacture reports a steady demand for iron bridge work, but the contracts go chiefly to builders who have iron-works behind them, who now seem to furnish the structural work to the consumers at the bare cost of manufacture; but the firm's contracts for erecting bridges for the makers are steadily increasing. Inquirers increase in number. A year ago it could compete for furnishing the material as well as the labor; now prices are closer for material, but not for labor. It considers prospects more promising.

Iron and Steel Manufactures.—These cover so many different branches that it is hardly to be expected that they should have a uniform experience at such a time.

The New Jersey Iron & Steel Co. has orders and inquiries about the same as last year. Prices are lower than last year and are now stationary. It looks for very slight improvement.

A great establishment which manufactures many different staples had a considerable demand for rail fastenings in September from the South and the Northwest, indicating some activity in construction by lines west of Chicago. This has made the order-book much fuller than it was a year ago or in the first half of this year. But prices are still very unremunerative. They are 5 to 10 per cent. lower than a year ago, and may be called stationary, with greater firmness on the part of manufacturers and a slight tendency to rise. The outlook for this company's rolling mills is for pretty full work for the next three months at a minimum of profit. For the next it does not see any signs of substantial improvement.

A Pennsylvania works finds the demand for light rails joints, spikes and bar iron much more active than a year or six months ago; for pig iron the demand is less. Inquiries were most numerous at the end of September, not as frequent as one or two months earlier, but more than a year ago. Pig iron is slightly lower than a year ago, rails about $5 a ton lower, though there has been an advance of $2 to $3 since spring and early summer. Joints, spikes and bar iron are 10 per cent. lower than last year, with little or no tendency to advance. The works is fairly busy, but not pushed; little or no advance in prices is looked for, but it would not be surprising if there were one next year.

An establishment in New York has about the same orders and inquiries as a year ago. Prices are lower. Prospects are not very bright.

An Ohio works has fewer orders and fewer inquiries than at any time previous since 1874. Prices were never so low, even in the worst years of the panic, and the tendency is to go lower. While hopeful, it does not look for improvement in its particular line this year at least.

Manufacturers of nuts, washers and bolts in the same place have about the same orders as a year ago, and more than in the first half of this year. Inquiries indicate an increased demand among builders of cars and farm implements. Prices are lower than a year ago or the first half of this year, and leave a less margin over cost. That there will be a greater demand in the last third of this year than in the previous two-thirds seems sure, but with little, if any, increase in prices or profits.

The Springfield Iron Company, of Springfield, Ill., reports a decided improvement in the demand for its manufactures, more orders and more inquiries. The increase last year is greater than over the first half of this year. Prices are somewhat lower than a year ago. The tendency is upward, but only a little advance from the lowest point has been secured so far. A fair demand for the next three months seems certain, which should continue throughout next year. The prospect for next year's crops will have much to do with this.

Another Western establishment has nearly twice as many orders now as a year ago or in the first half of this year, and inquiries are more numerous in the same proportion. Prices are about 12½ per cent. less. They seem to have struck bottom about April, as there has been no perceptible change since then. The feeling is better now, and while there is no marked advance, prices are firm and the tendency is upward. The prospects are for a better trade next year than in 1883 and 1884. The establishment has orders booked for next spring and early summer delivery, which can be used as running orders in winter, and it has much more work in prospect. It has refused a number of large orders for next year's delivery at present prices, not desiring to give its next year's work away without profit, and feeling sure that it can do as well, if not better, by waiting.

Machinery, Tools, etc.—While there are numerous replies from the manufacturers of these, many very important works, which are likely to have a goodly share of what orders are given out, have not reported.

S. C. Forsaith & Co., of Manchester, N. H., have had a better demand since the middle of September than at any time before for two years, and from inquiries steadily coming in, they have reason to hope that business will steadily improve; a majority of their business acquaintances have the same feeling. Prices are lower than a year ago, but with the upward tendency in iron there must be a feeling to increase them. Their orders in September were the largest for that month for four years, in number and amount, and orders are general and not for any one class of work. Prospects for the coming quarter and year are the best for two years.

The Pratt & Whitney Co. shipments do not differ much from what they were a year or six months ago, but are larger than in the last month of last year or the first of this; but the deliveries now are in small lots to many parties, and heretofore to fewer parties in larger lots, indicating an improvement in business generally and a change in the character of this company's business, sales being distributed over a larger territory.

The Clayton Air Compressor Works, which have not as

yet run at less than full time, are now employing more men than before for ten years. Inquiries are more numerous and the prospects are favorable for a continued increase in their business.

Manufacturers of pulley blocks find no improvement, in the demand, but better prices owing to a combination of manufacturers. They are not running to more than one-third of their capacity, and do not anticipate any improvement in the near future. The trade depends principally upon ship-building, railroad building and other contracting work.

Manufacturers of lathe and drill chucks in New York find the demand a little larger than a year ago, and inquiries more numerous. Prices are the same. Prospects are fair. The capacity of this establishment was increased three years ago and is now sufficient for double the work on hand.

The Tanner & Delany Engine Co., of Richmond, Va., has about 50 per cent. more orders than a year ago, and inquiries are twice as numerous as then. Prices are 5 to 10 per cent. lower, but the tendency is upward. The prospects are regarded as encouraging for more business and better prices than for two or three years past.

The Bucyrus Foundry & Manufacturing Co., which makes the Thompson iron steam shovel and derrick car, locomotive cylinders, frogs and switches, dredges, and has a large trade outside of railroad business, reports a less demand from railroads than a year ago, or even six months ago. It is working about two-thirds of a full force. Inquiries are much more frequent, especially for steam shovels. Prices are considerably less than a year ago, and less even than last spring, and in this particular line may not have reached their lowest point, because a number of new competitors have recently begun to manufacture, and to get orders from established works will probably have to cut prices.

The company believes that, while there may be no boom, there will be at least a fair demand, and fair prices in the near future. Inquiries and reports from agents and traveling men lead to the belief that brighter times are ahead. In some lines outside of railroad business, prospects were never more brilliant in the history of the company.

W. H. H. Smith & Co., of Toledo, manufacturers of pine dimension timber for cars, bridges, etc., whose business is almost exclusively with railroads and car works, report a much greater demand than a year ago. They then had a fair business, but took all the orders they could get, while now they are refusing orders, their capacity for this season being mainly engaged. Trade in the spring and till August 1 was very dull, and hard work and cut prices were required to secure orders. Others in the same business appear to have had a similar experience. Prices are higher than last spring and summer, and about the same as [a year ago. The tendency is upward. The firm are confident that trade and prices will be better next year than they have averaged this.

The Marion Steam Shovel Co., of Marion, O., has received a number of orders in the last two months, and has enough on hand to keep the works busy for six weeks, with prospects for more orders soon. Inquiries are more numerous in the first half of the year, and the company is getting better prices. The prospect for the last quarter of the year is good —better than for the previous quarter; dullness is expected in the winter, but quite a revival in the spring.

An important tool works in Ohio reports the orders for its machine tools considerably less than a year ago, but about the same as the average in the first half of this year; inquiries are more numerous than for a year past. Prices are about 10 per cent. lower than a year ago, and there is no present tendency to an advance; but there will certainly be one when prices of iron go up.

"The machine tool business is among the first to feel the effects of bad times and among the last to show signs of recuperation. People in other lines of manufacture have to get fully employed before there is much inducement to add to their plant, or for others to start into similar lines of business. We base our hopes for an improvement on the improvement that is apparently materializing in other lines. Should that continue to grow, we believe we will undoubtedly have a good business next year. Our business at this time is an exception to the first half of the rule stated above, that the machine tool business is among the first to show signs of depression. Our business has been remarkably good until the last six months. Since that time orders have not accumulated on our books, but we have kept fairly busy and are running full time with about two-thirds our regular force."

Blackmer & Post, of St. Louis, manufacturers of sewer and culvert pipe, sold during the first nine months of this year but a small fraction, if any, less culvert pipe to railroads than last year; but the demand was from a comparatively small number of great railroad companies, which are extending their lines; while the inquiry from new roads has been insignificant. Prices are about 20 per cent. lower than a year ago, and an improvement is not expected until next spring, when a marked increase in railroad building is confidently looked for.

The Livermore Foundry & Machine Co., of Memphis, whose principal business is iron fronts and building work, mill and plantation machinery, as well as railroad castings and brasses, reports that its railroad business has decidedly improved and is constantly increasing, which it attributes largely to the increase in the mileage of Memphis railroads. Building work has also improved decidedly, and the prospects of Memphis are bright.

An Eastern manufacturer of engineering instruments reports a slight increase in orders compared with last year, but no more than in the first half of this year. The orders from South America are greater than for two years past. Inquiries are decidedly more numerous. Prices are unchanged, with a slight tendency to strengthen. He looks for a slight increase in trade, but not for any such railroad boom as in 1880 and 1881.

The Michigan Car-Coupler Test.

The Commissioner of Railroads of Michigan, Wm. McPherson, Jr., has recently issued the following circular letter, of date Oct. 8, announcing that in view of the recent car-coupler tests at Buffalo, further tests will probably be dispensed with by him and a selection made from the twelve named at Buffalo:

Your favor of recent date, making inquiry in regard to the test of automatic and safety freight car couplers to be selected for use in this state, as provided by the enactment of 1885, is duly received.

The large number of letters of similar import received at this office, seem to make necessary a supplemental circular to that issued by me under date of July 10, 1885.

Since the issue of that circular, the Master Car-Builders' Association, through its Executive Committee, has held a test at Buffalo, N. Y., at which more than forty prominent coupling devices were offered for trial of their merits. Of these, after a fair and through test, the committee selected twelve to be placed upon the cars of different roads, for a thorough working test through the next winter. Their performance will be closely observed, and results reported at the next meeting of the Association, and from the twelve in all probability will be selected the devices to be adopted for use upon the cars of the companies represented by the Committee.

The officers of this department were present at the above mentioned test, and witnessed the performance of each coupler tested. By the courtesy of the Committee they were also enabled to carefully note all details of interest and value, bearing upon the cost and construction of each device presented.

It seems unnecessary to again go over the ground covered by the trial at Buffalo, and as a further general test would involve heavy expense both to parties presenting devices for trial and the state, I have concluded to dispense with that contemplated by the circular of July 10.

There seems no room for doubt that the recommendation of the Executive Committee of the Master Car-Builders' Association will determine the couplers with which the companies of New England States, New York, Pennsylvania, and Ohio, and the great trunk lines of the West, will equip their cars. With the roads of those sections especially our own have the largest, and constant interchance of traffic, and the best interests of companies and trainmen in their employ alike demand that the couplers to be selected for use under the provisions of our law should be as nearly uniform with those adopted by the companies of the above mentioned states as possible.

But that parties interested and not present at the Buffalo test may not be excluded from fair recognition by this department, if, upon presentation of their devices at this office I am of the opinion that their merits will warrant the incurring of the expenses of a practical working test, I will so advise, and suggest a plan for carrying the same into effect, and will give such devices due consideration in making any selections of couplers under the law.

The Cracking of Paint and Varnish on Cars.

The following paper was read before the Master Car Painters' Association at its recent convention in Toronto, by Mr. A. P. Sweet, Master Painter of the Detroit, Lansing & Northern Railroad:

Question.—"Why do paints and varnishes crack, and what is the reason that cracks in the latter are usually at right angles to the grain of the wood?"

The subject, as I understand it, relates to the trouble of cracking, etc., as experienced in connection with passenger car work, and as such I introduce it for discussion before this association.

There are many theories as to the cause of the cracking of paints and varnishes. Some are well defined. Others are not satisfactorily explained. I do not anticipate being able to add much to what is already known, but will advance a few thoughts which may call forth the views of others on the subject.

The old adage, "It takes two to make a quarrel," is as true when applied to paint and varnishes as it is to individuals. A single coat of either seldom, if ever, produces cracks. These make their appearance only after two or more coats have been applied; consequently it is necessary to have a body of color or varnish, consisting of two or more coats, before any trouble of this sort makes itself manifest. This being the case, it follows that the cause of the difficulty must be sought for in the coatings themselves, either in the quality of the material employed or in the mode of applying them. Poor and cheap oils and japans, especially the latter, are a fruitful source of cracking in paint, but by far the most prolific one, in my opinion, is the hurried application of succeeding coats before the preceding ones are dry enough to receive them.

If sufficient time is not given, cracks will inevitably follow such a mode of procedure. I am of the opinion, also, that very little blame can be attached to the wood used in the construction of car, as the most of it is comparatively well seasoned, and its expansive and contractive force is not sufficient to cause serious trouble. If green wood was used there might be room for this excuse, especially where the cracks run in the direction of the grain, and are large and deep.

Before pursuing this subject further, it may be well to examine a little into this theory of the drying of paint. It is purely a chemical process, not a mechanical one, as some suppose. Paint dries by the evaporation of its volatile parts and its absorption of oxygen, and it is heavier when dried than when in the liquid form; having attached to itself a sufficient amount of oxygen to very perceptibly increase its weight some six per cent.

The best grades of linseed oil are said to contain from 70 to 80 per cent. of substance called linaleine, a resinous and slow-drying oil acid, which imparts to the oil its elasticity.

In the process of drying contraction occurs; the various atoms of which the coatings are composed move closer and closer together, and as this contracting force is easier with than across the grain, cracks at right angles to it are formed. This fact suggests the necessity of so adjusting the elasticity of the various coats, that the force exerted in drying may be as nearly equalized as possible, as this contracting force is continued until all elasticity has left the paint and oxygen ceases to be absorbed, all the oil acid has disappeared and nothing but a hard, brittle surface remains.

Under the microscope, in the first stage of cracking the surface presents nothing unusual, except that the cracks appear clean-cut and sharp on the edges. As months pass by and the surface is exposed to the atmosphere, changes of heat and cold, wet and dry, the cracks become more numerous; and in the last stage, when the oil is entirely destroyed, the surface assumes the appearance of innumerable rectangular masses, higher in the centre than at the edges, like small mounds raised by the power of contraction and adhesion.

Cracking in color coats may by careful attention to preliminaries be reduced to a minimum, provided good, first-class materials are used and sufficient time given to each coat to dry.

Where varnish is to be applied as a finish, all coatings should have oil in their composition, and yet be mixed to dry flat. They should be applied very evenly and thinly, even if it necessitates an extra coat to cover and make a solid job.

Striping and ornamenting should be done on flat color, which gives time for hardening and fits it for the varnish coats to follow. If work is done in this way, I think very little fear of premature cracking need be entertained; at least not until time and weather has sufficient opportunity to play havoc with its beauty, and the natural decay of the materials themselves necessitates a thorough overhauling and repair. Rubbing varnishes is another source of trouble, causing the succeeding coats of finishing varnish to show signs of cracking long before they otherwise would, as it does not agree with the slower-drying varnishes usually applied above it, being of a harder and more brittle character; erving the purpose of producing a fine smooth surface, sbut sacrificing the durability of the job.

Concerning the cracking of varnish I have not much to say. It seems to me that many of the reasons given above will apply to it as well as the paint. Poor material in the shape of varnish is poor indeed. A first-class article only will give first-class results. It must be elastic, or it will crack early and badly, no matter how good the under coats of paint may be. Good varnish on good color coats will not give any signs of cracking until by repeated varnishing it has accumulated a thick coating of brittle, inelastic gum. No painter can say truthfully that his cars never crack, as it is a natural consequence of decay, and will come sooner or later to the best of material. That varnish cracks to a great extent at right angles to the grain of the wood, I think, is due in some degree to the same reasons as given above for the cracking of paint: and after its elasticity is destroyed by age, vibration has a great effect upon the hard and brittle coating of gum that remains, coupled with expansion and contraction caused by variation of temperature and the disintegrating influence of the weather.

Master Car & Locomotive Painters' Association.

The following circular to members has been issued by the Secretary, Mr. Robert McKeon, from his office in Kent, Ohio; it is dated Sept. 22, 1885:

At the late convention of Master Car & Locomotive Painters, held at Toronto, Canada, the annexed subjects were chosen for the next annual meeting of the Association, to be held at Chicago, Ill., the second Wednesday of September, 1886, to which the attention of the members is called.

Those appointed on the several questions were all present and accepted of the subjects assigned them by the President. The committee were appointed at this meeting for the purpose of giving sufficient time to prepare complete reports to be made at the next convention.

No. 1.—*What Remedies Can we Employ to Prevent the Cracking of Painted and Varnished Surfaces?* M. W. Stines, Barney & Smith Car Works, Dayton, Ohio; Wm. Davis, Canada Southern, St. Thomas, Ontario.

No. 2.—*Are Passenger Cars now Receiving Proper Care; what changes, if any, can be Recommended to Lengthen the Durability of our Painting?* Jos. Murphy, Louisville & Nashville, Louisville, Ky.; R. W. Scott, Canadian Pacific, Montreal, Can.

No. 3.—*Resolved, That Flat Surfaces and Flat Callors are Preferable to Glossy ones for Interior Decoration and Finish.* Affirmative: E. L. Fetting, New York & New England, Norwood, Mass. Negative: J. C. Stout, Kansas Pacific, Armstrong, Kan.

No. 4.—*What Improvements in the Methods and Materials now used in Painting Cars can you Recommend?* D. D. Robertson, Michigan Central, Detroit, Mich.; A. N. Bradley, Ohio & Mississippi, Cochran, Ind.

No. 5.—*Resolved, That when Paint on Baggage, Mail and Express Cars becomes Badly Cracked, it is more Economical to Burn Off the Paint than to put on New Sheathing. What is the Comparative Cost?* Affirmative: C. E. Felch, Southeastern, Farnham, P. Q. Negative: F. M. Weidner, New York, Lake Erie & Western, Buffalo, N. Y.

No. 6.—*Would it not be Economy to use a Higher Grade of Paint Stock if it could be Procured?* W. T. Ledford, Richmond & Danville, Richmond, Va.; Jno. Rattenbury, Chicago, Rock Island & Pacific, Chicago, Ill.

No. 7.—*Does it make any Difference in the Finish of a Coach whether the Nail-holes are Deep or Shallow, Large or Small, or whether the Surface is Leveled up by the Woodworker or Filled up by the Painter?* Affirmative: W. E. Hibbard, Boston & Albany, Allston, Mass. Negative: D. Herbage, Flint & Pere Marquette, East Saginaw, Mich.

No. 8.—*Has the Paint Material that you have used in the past year compared favorably with material used in previous years?* H. W. Walton, Providence & Worcester, Valley Falls, R. I.; Wm. Sharp, Lake Shore & Michigan Southern, Adrian, Mich.

A series of tests was ordered to be made of colors on panels, and a correct record kept of the application of each coat of paint marked on the back of each panel, the panels to be of convenient size for taking to the next convention by the committees. Tests to be made on white wood.

No. 1 Test Panel.—*Mix with* 10 *parts of oil*, 10 *parts Japan*, 80 *parts turpentine.* Jos. Murphy, Wm. Davis, J. H. Harnden, W. J. Russell, A. N. Bradley, M. W. Stines.

No. 2 Test Panel.—*Mix with* 20 *parts of oil*, 10 *parts Japan*, 70 *parts turpentine.* F. S. Ball, Jno. Rattenbury, G. W. Lord, E. L. Bigelow, F. M. Weidner, R. McKeon.

No. 3 Test Panel.—*Mix with* 30 *parts of oil*, 20 *parts Japan*, 50 *parts turpentine.* D. D. Robertson, H. W. Walton, J. C. Stout, E. F. Joslyn, W. E. Hibbard, W. H. Martindale.

No. 4 Test Panel.—*Mix with* 40 *parts of oil*, 20 *parts Japan*, 40 *parts turpentine.* C. C. Wood, C. E. Felch, Wm. Sharp, D. D. Robertson, F. S. Ball. E. L. Bigelow.

No. 5 Test Panel.—*Mix with* 25 *parts Japan*, 75 *parts turpentine.* E. L. Fetting, M. W. Stines, Wm. Davis, R. W. Scott, D. Herbage, C. C. Wood.

Keg lead and raw oil to be used for foundation in all tests, each coat to be mixed with the proportions of oil, Japan and turpentine as given. Finishing color the same. Paint one panel each, yellow, olive brown and Indian red.

Test panels to be varnished on the natural wood for outside finish of passenger cars.

No. 6.—*Two Panels of Different Woods, finished with one coat of Rubbing and two coats of Finishing Varnish.* W. H. Martindale, J. C. Stout. G. W. Lord, M. W. Stines, W. A. Harnden, Jno. Rattenbury.

No. 7.—*Two Panels of different Woods, finished with two coats of Rubbing and one coat of Finishing Varnish.* E. L. Fetting, C. E. Felch, R. McKeon, A. N. Bradley, W. J. Russell, E. F. Joslyn,

No. 8.—*Two Panels of Different Woods, finished with three coats of Finishing Varnish.* Wm. Sharp, R. W. Scott, W. T. Ledford, F. M. Weidner, H. W. Walton.

All members of the Association will receive the proceedings of the last convention, which will be published in full in the *Painters' Magazine.* Those who are not subscribers to the *Magazine* will be furnished by the Association with a copy for one year, by giving immediate notice to the Secretary.

English and American Engines and Cars.

A meeting of the New England Railroad Club was held in its rooms in the Boston & Albany passenger station, Boston, Wednesday evening, Sept. 23. Mr. J. W. MARDEN (Fitchburg), the President of the Club, was in the chair and announced the subject for discussion, "The Comparative Merit of American and English Locomotives."

Mr. LAUDER (Old Colony) opened the discussion by remarking that the kind of traffic to be hauled and the circumstances under which rolling stock is designed would naturally develop a locomotive that would be most suitable for performing the work under these conditions. While there were many things open to criticism in English locomotives, for instance the crank axle, which is liable to break on the rough roads of this country, their engines are best suited for their smooth tracks and comparatively light service. In this country we pull from one-third to one-half heavier trains than they do in England. Natural development has brought about certain kinds of engines, and probably for their roads English engines are superior to ours, but ours are better for our roads. Our engines will run on English roads, but theirs will not run on ours. If our engines were rigid, like many English engines, they would not stay on the track. The English get rid of many complications, for instance, the bogie truck, and if we could substitute a pair of wheels, sliding up and down in jaws similar to the driving-wheels, they would be less liable to get out of order. But we are obliged to use the bogie truck to run over our sharp curves and rough tracks.

Mr. RICHARDS (Boston & Providence): It is difficult to make any comparisons between the English and American engines. Each system grew up in its own way to perform certain work. There were some things in the American system that the English would not have if they could, and there are many things in the English system that we could not have if we would.

A great English railway station presents a novel and interesting spectacle. The great size of the glass roof, covering acres of ground; the great number and length of the tracks, the high stone platforms, the numerous waiting and refreshment rooms, the booking offices, cars with side entrances, locomotives different in appearance from ours, and without bells, headlights or pilots, the absence of hand-brakes on the cars (though nearly all are equipped with a power brake), and the differences in lighting are a few points that strike an American. Most of the stations are stone or brick, with iron roofs, and are lighted from the top, often by clear-story roofs. In many stations, a horizontal plate running the length of the covered track is placed just above the engine chimneys, to catch the soot, which would otherwise soil the glass roof. Most platforms are about 3 ft. high, and form an effectual barrier against crossing the track. Provision for crossing is made by bridges or underground passages. The refreshment and waiting rooms are graded for first and second-class passengers, and are heated with open grate fires. The hacks and carriages drive directly into the train house, and passengers step directly from the cars to the carriages in arriving; and in departing, from the carriages, through the ticket office, to the cars.

In suburban service, the train is made up and kept together, without uncoupling a car, for several months, when the whole train is taken into the shop for repairs. The cars are light compared with American cars. The old cars run on four wheels, the new on six, or on trucks. The second and third-class cars, by which the great majority of passengers travel, are divided into five compartments, seating 50 passengers in a car; the first-class into four compartments, seating 24 to 32 passengers—the former on main line service, the latter on suburban. These cars weigh about 20,000 to 25,000 lbs. Cars running on trucks are largely used on the best trains, weigh up to 50,000 lbs., and seat as many as 80 passengers. The cars in Germany and Switzerland are heavier and have iron sills, and are divided into the same number of compartments. They weigh 30,000 lbs. All passenger coaches are equipped with semi-elliptic springs. They are entered from the side, the doors having windows which let down like an old-fashioned coach-window, with a strap. The cars are lighted by lamps let down from the outside, through the roof of the car. Many of the cars in England and Germany are lighted with the Pintsch gas. The upholstering of the seats of the best coaches is very perfect. As much as 30 lbs. of curled horse-hair is used to each seat, in addition to a large number of sofa springs.

Fewer train hands are employed, but more station hands. The tickets are examined and collected by the station staff, and not by the conductor. They are generally examined before the passenger enters the car, and collected after he leaves it.

The tracks are generally very smooth and substantial, steel double or bull-headed rails weighing 80 lbs. to 92 lbs. per yard, laid in iron chairs weighing 30 lbs. to 50 lbs. each, being used in England. On the Continent the rails are of similar section to ours, but heavier. The ties are mostly wood, squared, lighter than ours, and placed at longer intervals. Iron sleepers are largely used in Germany and Belgium. Split switches are universal. Switches are brought together and worked by handles arranged in a cabin and interlocked. A very good style of switch is moved with a lever and weighted to stand normally right to the main line. It will only stand open for the siding as long as it is held.

The bridges on the English roads have no timber about them, and are solid and substantial, and in many cases have stood heavy traffic for over 40 years. Many roads run on viaducts through cities, the rail level being above the tops of the houses, though, unlike our elevated roads, the viaduct crosses the streets, and does not run along them. There are about 250 passenger stations in London. One railroad owns 44 passenger and 26 freight stations, all of these being solid and substantial brick and stone buildings; 450 trains a day run out of its principal terminal station, Liverpool street, and this number is nearly reached at several other termini. All the stations in Boston, including the Revere Beach and Point Shirly, dispatch 443 trains a day.

A great number of different types of locomotives are now in use. The one attracting most attention is the Webb's compound, which was illustrated in the *Railroad Gazette* Aug. 24, 1885. The double-ender engine for suburban traffic, designed by Mr. Worsdell, illustrated in the *Railroad Gazette* April 17, 1885, is also a novelty. Most engines for suburban traffic are either on the Forney principle, but with inside cylinders, or the ordinary American eight-wheel type, with the tank carried on the engine frame. On the Loudon & Northwestern, their 3,000 locomotives are not fitted with the ordinary spark arrester, but have a tapering hopper in the bottom of the smoke-arch, and the sparks, instead of going out of the stack, wedge themselves into this hopper and fall out at the bottom, practically extinguished.

Mr. LAUDER: There is one thing about the English locomotive that, I think, will bear a little investigation. We might try their style of tender, carried on six wheels on a rigid wheel-base. We do not hesitate to run Pullman cars on six-wheel trucks, and, I think, a tender carrying 3,000 gallons of water and three to six tons of coal might be run on six 42-in. wheels on passenger trains. I think there is a little too much prejudice in our minds against the English locomotives.

Mr. RICHARDS agreed with Mr. Lauder, that the six-wheel tender was preferable in many respects. The larger wheels would lessen the tendency of the boxes to heat. Hot boxes are rare in England. Forney engines do well, but are apt to injure the road when run with the drivers first.

Mr. LAUDER preferred for suburban traffic a locomotive with two pairs of drivers placed between the fire-box and the cylinders, with outside connections to the hind drivers; one pony truck forward of the cylinders, and another behind the fire-box, with provision for lateral motion. The Forney type is hard on the track and the driving flanges, when it is run with the latter in front. The tank is of secondary importance, but might be made separate from the engine, as it can be run backwards, if properly constructed.

Mr. RICHARDS: Headlights are useful at terminal stations, but prevent a proper sight of the signals. Red cannot be seen distinctly under such a powerful light, when the train is running from 40 to 50 miles an hour, and a green light appears yellow and a blue light is very pale.

Mr. LAUDER: A headlight on a road engine is of no use, and is rather a source of danger, as a man cannot see his switch lights. To be useful in the yard, it should be placed on the back of the tender. Headlights have produced disastrous results, on account of their glare on the signals, and many engineers would rather run in the night without one, as they can see better in the dark. It is only useful in approaching highway crossings, as travelers can see the headlight at a distance.

The PRESIDENT had found it difficult to make light cars run easily over a rough track, and wished to know how this was done in England.

Mr. F. D. ADAMS, Boston & Albany, considered that the difference in the dead weight of English and American cars was chiefly in the running gear. The greater weight of our cars is not in the body, but is caused by the trucks. Light cars are not as easy on curves as heavy cars, but it is not policy to build heavy cars simply because they ride easily, as it is expensive to haul dead weight. On the Boston & Albany we aim to build a light car, and the body weighing 27,000 lbs. for 70 passengers is really lighter per passenger than the body of an English car. The trucks, which weigh 18,000 lbs., are, however, heavier than the six wheels in a rigid wheel-base. The English cars carry a smaller proportion of their seating capacity, owing to the class system, the first-class being nearly empty and the average number of seats filled being from one-third to one-fifth of the seating capacity, while on our suburban trains we carry so many passengers that they are often obliged to stand up. We build cars that carry dead weight per passenger as low as they do. We do not have many serious accidents on account of the light build of our cars. The Old Colony cars possibly are heavier than is necessary. It costs us, say from here to Albany, $1 for every ton, and it will not take very long to pay for the car at that rate. Some cars weighing 51,000 lbs. do not carry any more passengers than a lighter car. A car designed by Mr. Chamberlain weighed 36,000 lbs., complete, wheels and all; it is 54 ft. long, and carries 70 passengers. It has run six years and is comparatively a good car to-day, and is without a defect. In an accident it may be broken up badly, but it has taken its chances along with the other cars. I think Mr. Richards has come home carried away with English system, and I am afraid he is loosing his "Yankeeism," I am a full-blooded Yankee, and I don't take very much to English notions. I have not seen anything yet superior to our American system.

Mr. FOLSOM (Boston & Providence): An American car, as made to-day, is very safe under all circumstances; an English car very weak. There is nothing in this country to equal the loss of life in a collision on an English road. Our cars can run down an embankment a mile long without much damage. I had the pleasure of going on the other side about two years ago, and I paid some attention to the railroads, but was so perfectly satisfied that I did not criticise anything over there, or make any comparisons. Their system is very good for them and our system is quite good enough for us. While in Italy I saw some of the finest passenger cars that can be seen in any country, fully equal to American cars. I saw a military hospital car at the Milan Exhibition 40 ft. long, made so as to swivel, with platforms on the ends and a passage through the car. In Switzerland all the cars are pretty heavy, with iron sills. There is no business in the world in which so much money is spent in experimenting on improvements as in railroads. There is always something being brought to our attention that you can economize on.

I should like to see an American car on an English road. The English people see a great many things to praise in American railways, and we see a great many things to admire in their system, and I think that in the United States we are coming down to simplicity in the construction of our cars. I can remember when an engine came out of the shop painted all the colors of the rainbow. Mr. Vanderbilt on the New York Central first painted his engines black, and about all the railroads throughout the country have followed his example.

Far too much baggage is carried in this country, and a baggageman should not be expected to handle trunks weighing as much as 800 lbs. Ordinary Saratogas often weigh over 200 lbs. Such trunks can only be handled by a species of legerdemain or twist of the wrist. Passengers are more modest in the weight and number of their trunks abroad, and some restriction should be imposed here.

The Institution of Civil Engineers.

This representative body of English engineers now number in all 4,863 persons. Of this large number, however, only 3,502 are "corporate members" practicing their profession. Of the balance, 846 are "students" and 515 "associates', interested in engineering, though not in a strictly professional capacity.

This Institution invites original papers on the following or other subjects, to be read and discussed during their ensuing winter session. Membership is not an essential qualification, outsiders taking part in the weekly discussions and being eligible for the prizes awarded for the best papers. The weekly meetings at Westminster are limited to 90 minutes' duration and are models of their kind, the speakers, with rare exceptions, keeping strictly to the point, and generally much valuable information being elicited.

Recent Experiments on the Strength of Materials.

Machines and Apparatus for Testing Metals, and the Equipment generally of Mechanical Laboratories.

The Thermic Properties of Metals commonly used in the Arts, especially with respect to Conductivity and Diathermancy at high temperatures.

The manufacture, properties and use of castings of Malleable Cast-Iron and Cast-Steel.

The Effect of Cold-hammering and Cold-rolling upon Iron and Steel.

The Present Position of the Manufacture of Steel—its defects, and suggestions for its improvement.

The various Processes of Tempering Steel, and their effects.

Modern Machine Tools and Workshop Appliances for the treatment of Heavy Forgings and Castings.

The Testing of Work done by Motors and Machines.

Analyses of different types of Steam Engines as shown by Independent Testing.

The Production of Heating-gas from Coal.

The Production of Ammonia and other useful substances in the Manufacture of Coal-gas.

The heating of Steam Boilers with Producer-gas.

The Application of the Compound Principle to Locomotive and Portable Engines.

The Driving-axles of Locomotive Engines.

The effect of sea water on wrought and cast-iron structures, and the best means of preserving the same.

The Economical Construction and Operation of Railways in countries where small returns are expected.

Descriptions of recent Metallic Arch Bridges.

The Machinery and Labor-saving Appliances used in the execution of Public Works and Buildings.

Appliances for the Rapid Shipment of Coals, with a comparison of different methods.

Electro-motors; their theory, practical construction, efficiency and power.

The Construction of Dynamo-electric Machines and their Prime Movers.

The Working and Cost of the Treble and Double Wire Systems of Distributing Currents for Electric Lighting.

Thermo-electric Batteries and their Application to Electric Lighting, Electro-plating and other purposes.

On some of these subjects Americans probably have had more experience than the people of any other country, and they should be able to give some valuable papers.

TECHNICAL.

Quick Yard Work.

A correspondent of a Western paper says: "The third transcontinental tea train over the Denver & Rio Grande road, consisting of fifteen cars, passed through Pueblo, Col., at 8 o'clock on the morning of Sept. 4. A fine piece of switching work was done by the railroad boys when it arrived; they changed engines, changed cabooses and added three more cars of freight to the train, all on the wing, not stopping the train at all, which kept right on running through the town at the rate of not less than twelve miles an hour. The manner in which this was performed was as follows: The engine was held ready on the main track, while the incoming engine was cut off and switched on a side-track, allowing the cars to run up to the fresh engine, which started up, allowing them gradually to come together. The caboose was dropped off, and a third engine was ready on another side track, and overtook the train after it got past the switch, and attached three cars and a new caboose while all were in full motion. This was done under the supervision of the yard-master, Sam Stewart, late of the Ohio & Mississippi.

"These three tea trains, of which the one just described was the third, have caused large mention among railroad men in Denver. The men at Grand Junction and Salida did the yard work in from 5 to 12 minutes, and telegraphed to Pueblo 'how is that?' This put the Pueblo men on their mettle, and the second train was stopped in that city only 1 minute and 40 seconds, and the third train is recorded as having arrived and departed at 8 a. m., not showing any stop at all.

"The train was brought to Pueblo by Engineer Hill and Conductor Harrison, having come from Salida, 97 miles, in 3 hours and 27 seconds. It was taken north by Engineer Daly and Conductor Wilds, and reached Denver, a distance of 120 miles, in 6 hours and 20 minutes. This freight was transferred at Denver to the Burlington & Missouri cars at the rate of 10 minutes to each car.

"This second train consisted of 25 car-loads of tea on the way from San Francisco to New York, valued at nearly $1,000,000. It made the trip over the entire length of the Denver & Rio Grande from Ogden to Denver, including the Mountain Division between Grand Junction and Canon, over the grades of 211 ft. to the mile, at the rate of 20 miles an hour."

Underground Electric Wires.

Messrs. Theodore Morse, Jacob Hess and Chas. Loew, commissioners for inquiring into the question of laying telegraph and other electric wires underground, held a session on the 13th inst., in New York, and the representatives of different inventions for this purpose appeared before them.

The Standard Underground Cable Co. appear to be one of the few firms who can quote actual practice in the matter, most of the inventions being yet in the experimental stage. This company use Waring's patent lead-covered wire, which is largely employed in Washington, Pittsburgh, Chicago, New York and elsewhere, chiefly for telegraph and telephone wires, though experiments indicate that it can be successfully used for electric wires. This cable is largely used by the Union Switch and Signal Company, of Pittsburgh, who have recently given an order for 300,000 ft.

The wire is surrounded by a hydro-carbon insulating material of very low specific inductive capacity, and very high insulating quality. Cables of the lightest insulation have been tested by Mr Frank L. Pope, and found to give an insulation resistance of 946 megohms per mill. This material is reported to resist a high degree of heat, and will probably prove very durable even when laid near steam heating pipes. The cable is formed by surrounding one or more insulated wires with lead. The cable is then very flexible, and can be laid directly in the ground, or in a wooden trunking, or in any form of underground conduit. Over 2,000 wires can be laid in one conduit one foot square, and as many as 100 telephone or telegraph wires can be placed in one metallic sheath. The metallic sheath screens each conductor from all induced currents from adjacent parallel conductors. Branching and looping of individual conductors can be easily arranged, and any one conductor in a cable can be readily found.

These cables have now been in use for three years, and are used by the Municipal Telegraph and Telephone Department, the national government department in Washington, the Baltimore & Ohio Telegraph Company, the New York Fire Department, the Municipal Telegraph Department of Philadelphia, the telephone companies of Pittsburgh and Chicago; the United Lines Telegraph Company, and by the Union Switch & Signal Co., several railroads, and in many mines throughout the country.

Blast Furnace Notes.

Furnaces are blown, or soon will be, as follows: Katahdin, in Maine, Nov. 1; the Lanesboro and one of the Richmond furnaces, in Massachusetts, shortly; the Hunts-Lyman, in Connecticut, this week; in Pennsylvania, one of the Spearman furnaces at Sharon, this week; the enlarged Robesonia furnace, about Nov. 1; No. 2 Colebrook furnace, at Lebanon, Oct. 3; in Ohio, one furnace, in the Hocking Valley, before the end of this month and a second shortly after, to be added to the three now in blast out of the 14 in the valley; one of the Cherry Valley furnaces, at Leetonia, last week; in Indiana, the Vigo furnace, shortly. On the other hand, the Montgomery furnace, at Port Kennedy, Pa., went out of blast Sept. 23; the Northwestern furnace, in Wisconsin, will blow out shortly; one of the South Pittsburgh furnaces, in Tennessee, has blown out for repairs.

RAILROAD GAZETTE

Published Every Friday.

EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

THE RAILROAD SUPPLY TRADE.

Elsewhere we publish, this week, a summary of the replies received to extended inquiries made among manufacturers and dealers of railroad rolling stock, materials, machinery and supplies. Such replies themselves are the best evidence possible of the condition and prospects of the various branches of the trade. It will be seen that the reports vary greatly. Locomotive builders, with one or two exceptions, report great dullness, and some have no orders at all. The few car-builders reporting have quite as plentiful a lack of orders. On the other hand, most of the bridge-builders note a decided increase in the demand, and so do several of the iron works and many manufacturers of machinery, etc. Nearly every reply gives evidence that trade has been very bad; and very few indicate that it is now what may properly be called good, for most of those who have plenty of work are making very little profit. Yet the general conclusion from the mass of evidence is that business is improving, not only because a number of establishments are doing better than they did, but because of the almost universal evidence that *business is nowhere getting any worse.* This is a fact of very great importance. What changes there are almost universally are improvements. After going down for two or three years, business has remained almost stationary for a year, and now takes an upward turn—not universal, in some lines not even common, and not great in anything scarcely, yet distinctly upward. This is an encouraging fact. It is not proof that the improvement will be continuous and become great: it has not lasted long enough or become great enough to show that the country has immediate occupation for all its productive enterprises, or that there will not have to be some further readjustment and redistribution of our productive energies—the withdrawal of capital and labor from some branches of industry and their application to others. Such a redistribution is likely to occur at intervals in a rapidly growing country, after a time of great industrial activity and large profits. At such times many works are likely to be established where under ordinary circumstances they cannot compete with others more favorably situated, and in some branches of business a great excess of productive capacity may be provided—an excess over any probable ordinary consumption. In 1881 we built nearly 12,000 miles of railroad, and provided the materials for it mainly by works in this country. We shall not venture to say that we shall never build 12,000 miles of railroad in one year again, but we certainly shall not build so much every year. But if there are works enough to provide materials and equipment enough for 12,000 miles of railroad in one year, there will be too many when we build much less than 12,000 miles; actually last year we built less than 4,000 miles, and we shall not complete so much this year. Now, this great decline in railroad construction necessarily has greatly reduced the demand for materials, and left most works with light business. This has been aggravated by the condition of railroad business on existing roads. A great many of them have been having a hard time, and have reduced their expenditures as low as possible. This has prevented their making renewals that were really needed. Numerous analyses of railroad reports that we have presented have shown great decreases in maintenance expenses. A very large part of this is chargeable to smaller purchases of supplies.

Now, a great increase in railroad construction is not to be looked for nor desired; but a large increase in the expenditures of the railroads now in operation is desirable, and may be expected as soon as they have an increase in earnings, and in many cases, probably, as soon as they feel sure that they will suffer no further decrease in earnings. Not a little of the apparent saving of expenses for two or three years past has been simply due to a consumption of capital. Roads with a full stock of cars—and most roads had a full stock—have side-tracked cars when important repairs were required, and taken spare sound ones; there are companies which can "save" immense sums in this way, if they start with everything in prime condition. It is often a legitimate policy—being the postponement of expenditures until they are actually needed. One railroad company which, like most other companies, had shown an average expenditure of $50 or $60 a year each for maintenance of freight cars, suddenly expended less than $20 each. It had an excessive stock of cars, and probably had enough serviceable ones after a thousand or two had been laid up needing $50 to $100 worth of work apiece. Its stock of cars—its capital—was worth much less than it cost, and could not be made available without an expenditure large enough to pay 2 or 3 per cent. on its stock—that is, it had virtually been paying expenses out of capital. Tens of millions of dollars have been "saved" in this way lately, and every dollar of it will have to be made up some day, and in many cases the economy has continued so long that there cannot be much more delay. For most railroad supplies the demand is greater for maintenance than for the average amount of new construction, so that the return to a normal consumption by the old roads will of itself cause a considerable improvement in trade.

A further improvement, which would be more felt by some branches of business, would be caused by a considerable increase in traffic, not so much because of the increase in wear and tear, but because railroad companies are likely to do in their own shops in very dull times what they would buy of manufacturers if their traffic was heavy. When busines is slack, repair work does not keep the shops busy, and to keep the men and utilize shops and tools the companies are likely to make what few cars and engines they want. Comparatively a small increase in traffic may fill the shops with repair work, and then orders for new cars go to outside works. This makes the business of manufacturing some railroad supplies—especially freight cars—for sale an exceedingly precarious one, and accounts for the almost total lack of business often complained of in dull times. Not only are fewer cars made at such times, but the manufacturers get a much smaller share of the few that are made.

If, as there is reason to hope, we have reached the turning-point in business, and people become generally convinced simply that times will not get any worse, it will have a great effect on most kinds of business, because it will then be safe to buy and build; whereas for some time past the chances were that anything bought one month would be worth less than it cost a few months later. This condition of things and the fear that it will continue strangle all legitimate enterprises. Now, there are strong indications that people generally do now believe that times will not grow any worse. Prices of railroad stocks might be quoted as an evidence, but there is so much manipulation of these that this evidence is properly distrusted. But prices of railroad bonds are not manipulated to any extent, and these prices have risen steadily and largely for six months or more, especially of those bonds which previously had fallen in price because of a fear that we had not seen the worst of our bad times.

It should be needless to say that there are no signs of great business activity and a great rise in prices, as in the fall of 1879 and afterwards. There is nothing to make a "boom" out of. The farmers have not been doing very well for two years, many of them not for three or four years. They cannot, except perhaps in the South, do very well this year, unless there is an important and unexpected advance in the prices for their produce. When they have had two or three years of good crops and good prices for them, as in 1877, 1878 and 1879, we may have something like a boom again. Meanwhile most of us will be glad to find a moderate demand for our goods at living prices. That will be a great improvement for many.

PROGRESS OF CHICAGO RECEIPTS AND RAILROAD MILEAGE.

The railroads west of Chicago since 1872 have been very greatly changed by additions to their mileage. Some of them are scarcely recognizable as the same roads, as, for instance, the Chicago, Milwaukee & St. Paul, which has increased its average mileage worked from 1,360 miles in 1872 to 4,780 in 1884, and, indeed, was not a Chicago railroad at all in 1872. The Chicago, Burlington & Quincy has even a greater percentage of increase, and of the important carriers of produce to Chicago, only one, the Chicago & Alton, has made so small an increase in mileage as 35 per cent. since 1872, while the Rock Island has gained 43 per cent., the Illinois Central 80 per cent., the Northwestern 121 per cent., the Milwaukee & St. Paul 252 per cent., and the Chicago, Burlington & Quincy 344 per cent. These six railroads together worked 5,518 miles of railroad in 1872 and 16,133 in 1884, an increase of 10,615 miles, or 192 per cent. A single one of them had in 1884 six-sevenths as much road as all six of them in 1872.

We purpose below to see to what extent the main branches of Chicago traffic in farm produce have been affected by this great extension of the lines which bring it most of its receipts of such produce, and by which are shipped most of the merchandise which it sells, premising that lumber is the only merchandise shipped which we shall consider, in default of adequate statistics. The following, therefore, is substantially a study of the extent to which the receipts of farm produce at Chicago by the different railroads west of it have changed from 1872 to 1884, the figures being from the reports of the Chicago Board of Trade. The whole story is told by the accompanying table.

Let us first consider the totals. The increases in the total Chicago receipts have been:

Flour	3,428,816 bbls	or 224.0	per cent.
Wheat	13,673,446 bu.,	" 107.6	"
Corn	12,214,358 "	" 21.6	"
Oats	25,030,646 "	" 167.0	"
Grain and flour	69,776,938 bu.,	or 85.0	per cent.
Cattle	1,153,622 head,	" 165.7	"
Hogs	1,888,037 "	" 54.0	"
Coal	2,444,772 tons,	" 175.0	"
Lumber (shipments)	523,147 M ft,	" 125.5	"
Railroad	11,581 miles,	" 274.0	"

Thus there are great increases in the total receipts of everything except corn, but in nothing has it been as great in proportion as the increase in the mileage of the railroads which carry produce to Chicago.

Among these railroads are two now which had no Chicago terminus in 1872. Freight was brought from their lines to Chicago, in 1872, to some extent by other railroads, but now as then, and more now than then, the Chicago railroads bring to Chicago a great amount of produce from the thousands of miles of their western connections, as from the Atchison, Topeka & Santa Fe, the Union Pacific, the Northern Pacific, the St. Paul & Manitoba. The effect of the Wabash, however, is greatly modified by the fact that Chicago is but one of its three lake termini, and not the most important one, for grain receipts, though probably it is for live stock receipts. But explanations are required also for other railroads. The vast system of the Chicago, Milwaukee & St. Paul still has a principal terminus at Milwaukee, though probably it now brings more freight to Chicago than to that place: not as much wheat and flour, perhaps, but more of almost everything else. On the other hand, the Northwestern has recently completed a line from the west into Milwaukee, and delivers large amounts of freight there. The Illinois Central has obtained its line to New Orleans since 1872, and its shipments to the South have grown faster than those to Chicago.

With these explanations let us take up the different branches of traffic.

Flour receipts have increased more than anything else at Chicago. They have more than trebled since 1872. But of the whole increase of 3,428,816 barrels, 2,252,826 barrels were brought by railroads which did not carry to Chicago in 1872, but exclusively to Milwaukee and Toledo. There remain 1,175,990 barrels as the aggregate increase of five railroads which worked 4,316 miles of railroad in 1872 and 11,599 in 1884, an increase in their flour business of 80¼ per cent. More than half of this latter gain was by the Rock Island, which is due to its new line to Minneapolis, and the indications are that all but a small part of the great increase in flour has come from Minnesota, as the three companies whose lines reach that state bring 85½ per cent. of the whole, and the

CHICAGO RECEIPTS, 1872 AND 1884.

		C. & N. W.	C., M. & St. P.	C., B & Q.	C., R. I. & P.	C. & A.	Ill. Cen.	Canal.	C. & E. Ill.	Wabash.	Total.
Miles	1884	3,720	4,780	3,399	1,384	850	2,000	.....	246	3,518	19,897
	1872	1,684	.....	767	969	630	1,108	.....	158	.....	5,316
Increase		2,036	4,780	2,632	415	220	892	.....	88	3,518	14,581
Flour	1884	1,457,637	2,086,876	237,837	698,259	118,245	12,971	89,406	12,335	165,946	4,960,830
	1872	1,027,335	.....	113,623	94,819	67,100	153,484	17,566	960	.....	1,532,014
Increase or decrease		+ 430,302	+ 2,086,876	+ 124,214	+ 603,440	+ 51,145	— 140,513	+ 71,900	+ 11,435	+ 165,946	+ 3,428,816
Wheat	1884	5,995,368	5,311,699	6,426,078	1,887,726	2,383,989	1,203,915	7,559	233,334	2,794,387	26,397,587
	1872	6,606,808	.....	1,010,438	1,793,450	25,070	2,955,445	4,808	5,600	.....	12,724,141
Increase or decrease		— 611,440	5,311,699	+ 5,415,640	+ 94,276	+ 2,358,919	— 1,751,530	+ 2,751	+ 227,734	+ 2,794,387	+ 13,673,446
Corn	1884	4,764,634	1,611,650	31,245,530	6,474,421	4,080,475	3,337,120	1,157,247	679,660	6,132,839	59,580,445
	1872	4,411,139	.....	11,804,124	7,627,698	6,621,420	8,126,969	7,157,274	1,612,800	.....	47,366,087
Increase or decrease		+ 353,495	+ 1,611,650	+ 19,441,406	— 1,153,277	— 2,540,945	— 4,789,849	— 6,000,027	— 933,140	+ 6,132,839	+ 12,214,358
Oats	1884	6,962,218	7,402,257	10,775,620	6,273,137	1,193,897	4,839,967	693,895	474,896	1,454,739	40,082,362
	1872	3,381,764	.....	3,917,673	2,152,896	701,240	3,476,740	851,589	543,020	.....	15,051,716
Increase or decrease		+ 3,580,454	+ 7,402,257	+ 6,857,947	+ 4,120,241	+ 492,657	+ 1,363,227	— 158,694	— 68,124	+ 1,454,739	+ 25,030,646
Cattle, No.	1884	269,173	201,844	480,481	232,457	257,913	89,208	.....	23,016	230,303	1,817,697
	1872	98,718	.....	243,458	94,600	142,121	81,653	.....	8,662	.....	684,075
Increase		+ 170,455	+ 201,844	+ 237,023	+ 137,857	+ 115,792	+ 7,555	.....	+ 14,354	+ 230,303	+ 1,133,622
Hogs, No.	1884	1,149,984	702,959	1,313,294	759,140	332,318	493,006	.....	76,959	329,877	5,376,565
	1872	644,293	.....	1,043,375	563,054	371,800	686,880	.....	51,446	.....	3,488,528
Increase or decrease		+ 505,691	+ 702,959	+ 269,919	+ 194,086	— 38,482	— 193,874	.....	+ 25,513	+ 329,877	+ 1,888,037
Coal, tons	1884	221	27,528	85,084	16,783	821,918	41,690	1,291	355,902	94,947	3,842,796
	1872	8,196	.....	28,832	15,346	206,780	76,590	7,213	214,752	.....	1,398,024
Increase or decrease		— 7,975	+ 27,528	+ 56,252	+ 1,437	+ 615,138	— 34,900	— 5,922	+ 141,150	+ 94,947	+ 2,444,772
*Lumber, M ft.	1884	68,953	44,653	318,820	70,850	133,971	62,820	31,044	41,757	113,247	940,147
	1872	44,949	.....	88,656	30,746	73,808	82,575	37,539	21,316	.....	417,000
Increase or decrease		+ 24,004	+ 44,653	+ 230,164	+ 40,104	+ 60,163	— 19,755	— 6,495	+ 20,441	+ 113,247	+ 523,147

* Shipments.

gains of 108 per cent. by the Burlington, 76 per cent. by the Chicago & Alton, 400 per cent. by the canal, and the considerable receipts by the new Wabash line, offset by the decrease of 92 per cent. by the Illinois Central, amount to an increase of but 284,127 barrels, or not one-twelfth of the total increase.

In *wheat* receipts we find a total increase of 107½ per cent. from 1872 to 1884, not half as great a rate as the flour increase. The receipts by the different routes show some remarkable changes. Of the whole increase of 13,673,000 bushels, 8,106,000 were brought by the two new roads. Of the six railroads which brought wheat to Chicago in 1872, two brought *less* in 1884, the Northwestern 9 per cent. and the Illinois Central 60 per cent. less, while the gain of the Rock Island is but 5 per cent. On the other hand, the Chicago & Alton brought next to nothing to Chicago in 1872, and a large amount (nearly 100 times as much) last year, the small amount in 1872 being due, probably, either to a failure of wheat on its lines or to a better market for it in St. Louis than in Chicago, which was common in those days, St. Louis then being the great milling point for the best flour, as Minneapolis is now, and getting its fine wheat very largely from Illinois. The Chicago, Burlington & Quincy makes the largest gain (in amount), bringing 641 per cent. more than in 1872, due chiefly, no doubt, to the development of wheat growing in Nebraska and Kansas and the company's great extensions in wheat-growing country. It led in wheat deliveries at Chicago last year, with 24⅛ per cent. of the whole; while it stood fourth in 1872, with 8 per cent., when the Northwestern stood first, with 52 per cent. of the whole. The decline of the latter is due partly to the greater proportion of wheat converted into flour in the country which it serves, largely to the extension of the Milwaukee & St. Paul to Chicago, enabling it to deliver there shipments from its system which formerly the Northwestern carried from Milwaukee to Chicago, and partly to the extension of the Rock Island to Minneapolis, diverting part of its shipments.

Taking flour and wheat together, the St. Paul leads in 1884 with 30 per cent. of the whole, followed by the Northwestern with 25¾ per cent., while the Burlington, the leading wheat carrier, brought but 11¼ per cent., and the Rock Island 10⅛ per cent. The three roads with lines to Minneapolis all carry more flour than wheat, in the aggregate 13,194,793 bushels of wheat and the equivalent of 19,082,473 bushels in flour—just about 50 per cent. of the wheat and 85 per cent. of the flour, and 66 per cent. of the total wheat and flour.

The comparatively lighter movement of wheat and flour by the more southern lines must have been due to the low rail rates to the East, which cause shipments to be made by lines which pass south of the lakes and Chicago, while in 1872 and before most of the wheat from points far south of Lake Michigan went to Chicago to get the cheap lake and canal rates. From points farther north the grain has gone to Chicago, whether it was to be forwarded thence by rail or by water; but now the more northwesterly country is shipping largely from Lake Superior ports, avoiding Chicago altogether.

The increase in corn receipts at Chicago in 1884 over 1872 was comparatively small, due partly to the light crop of 1883 (marketed in 1884), but also largely, no doubt, to the low rail rates, which have permitted the marketing of corn by lines passing south of Chicago, which give short lines for nearly all the corn country, but for only part of the wheat country. While there was an increase of 12,214,000 bushels in the total corn receipts, the two roads opened to Chicago since 1872 brought 7,744,489 bushels. There is a small gain (8 per cent.) by the Northwestern, but the only important gain by any old road is the enormous one of 19,441,000 bushels (165 per cent.) by the Burlington, while all the other roads have a decrease, which is very large in some cases—6,000,000 bushels (83¾ per cent.) on the canal, 59 per cent. on the Illinois Central, and 38 per cent. on the Chicago & Alton. Of the six lines south of the Chicago & Northwestern, five lose, in the aggregate, 15,417,000 bushels, but the other one, the Burlington, gains 19,441,000. The percentages of the total corn receipt brought by different roads were:

	C. B. & Q.	R. I	Wabash.	C. & N. W.	C. & A.	Ill. Cen.	Canal.
1884	52.4	10.9	10.3	8.0	6.8	5.6	1.9
1872	24.9	16.1	...	9.3	14.0	17.2	15.1

The receipts of *oats* have become very important only of late years, when the failure of corn crops stimulated the demand for them. They are not now so important as the figures indicate, as a bushel of oats weighs but four-sevenths as much as a bushel of corn, and the 40,000,000 bushels brought to Chicago last year made only as much freight as 22,904,000 bushels of corn or 21,268,000 of wheat. This, however, is equal to four-fifths of last year's large wheat receipts. There has been a gain in oats receipts by all routes except the canal and the Eastern Illinois. Of the whole gain of 25,030,000 bushels, 8,857,000 came by the two new roads, 6,858,000 by the Burlington, 4,120,000 by the Rock Island, and 3,580,000 by the Northwestern. Last year the Burlington brought 26¾ per cent. of the whole; the Milwaukee & St. Paul, 18½; the Northwestern, 17½; the Rock Island, 15⅝; and the Illinois Central, 12 per cent.

The total increase in *cattle* receipts is no less than 165 per cent., amounting to 1,133,622 head, of which 432,147 arrived by the new roads. The old roads, therefore, gained 701,475 head, or 104 per cent. They all gained; the largest gain in number, as in so many things, was by the Burlington, but its percentage of gain was but 98 per cent., against 177 by the Northwestern, 146 by the Rock Island, 81⅛ by the Chicago & Alton and 10 per cent. by the Illinois Central. The Northwestern and the St. Paul are but beginning to feel the development of cattle-growing on the line of the Northern Pacific. The Wabash carried nearly as many cattle to Chicago as the Northwestern and more than the Milwaukee & St. Paul.

The receipts of *hogs* have not increased nearly as fast as the cattle receipts—54 per cent., against 165. Of the whole gain of 1,888,037 head, 1,032,883 were by the two new lines, leaving 855,201 (24½ per cent.) for the old railroads, which have increased 270 per cent. in mileage. Nearly three-fifths of this latter gain was made by the Northwestern alone, which gained 78 per cent., against the Rock Island's 35 per cent., the Burlington's 26, the Eastern Illinois's 50 per cent.; while there is a decrease of 10 per cent. on the Chicago & Alton and of 28 per cent. on the Illinois Central. The proportion of the receipts from the lines to the southwest has been reduced, perhaps, by the growth of a great packing business at Kansas City and other places on the Missouri River, etc. At least, the gain has been greater on lines further north. The Burlington still holds the first place, but while it brought 30 per cent. of the whole in 1872, it had only 24½ per cent. last year, while the Northwestern has risen from 18½ per cent. to 21½ per cent., and the Wabash brought 13 per cent.

We now leave farm products and come to the *coal* receipts at Chicago, which are naturally brought by those railroads which have coal mines on their lines, and in this respect the quality of the coal and its distance from Chicago have an important influence. Only two railroads of the Western lines named above carry much coal *to* Chicago, and even the receipts by them are trifling compared with the movement over many railroads in the East. But Western coal forms the smaller part of the Chicago receipts. For domestic purposes Chicago burns anthracite chiefly. Its iron works use Connellsville coke very largely, and its position on the lake enables it to obtain the superior bituminous coals of Pennsylvania and Ohio, as well as anthracite, at so low a rate as to limit the consumption of the Illinois coal. It is a most signficant fact, however, that the total receipts of coal at Chicago since 1872 have increased 175 per cent., indicating an industrial growth greater than the growth of population, a fact of the utmost importance to the railroads. The Chicago coal consumption, however, does not equal its receipts, for anthracite is carried thence by all the railroads and Illinois soft coal by those which have no mines on their lines in Illinois or Wisconsin. Thus, more coal was shipped than received in 1884 by all the western railroads named above, except the Chicago & Alton, the Eastern Illinois and the Wabash, and in the aggregate the shipments by these roads were 953,310 tons against 1,445,354 tons received by them.

This leads to the consideration that the coal traffic of the different railroads is very different from, and in most cases much larger than their deliveries at Chicago. The companies with great systems of railroad west of the mines naturally carry more west, to supply the country on their lines, than east to Chicago, to meet the competition of better coals from the East. The Chicago, Burlington & Quincy, for instance, carries great quantities of coal from the mines in the vicinity of Streator, but comparatively little of it, we see, goes to Chicago. The Chicago & Alton, having a much smaller territory on its own lines to supply, delivers at Chicago more than half of all the Western coal brought there, and the Eastern Illinois, with only 246 miles of road, nearly a quarter. The report of the Chicago & Alton shows that nearly two-thirds of all the coal carried by it went to Chicago. The Rock Island, which has coal mines on it in Illinois about 100 miles from Chicago, last year carried in all 703,265 tons of soft coal, 431,005 of them westward, but only 16,783 to Chicago. Thus it must be remembered that the figures in the table represent strictly the *Chicago receipts*.

The largest item of freight shipped from Chicago is lumber, but there is reason to believe that it is a smaller proportion of the whole now than it was formerly. Since 1872 the shipments of lumber have increased 523,147,000 ft., or 125 per cent., however. Of this the two new roads carried 157,900,000 ft., leaving a gain of 365,247,000 (or 88 per cent.) by the others. Nearly two-thirds of this was gained by one road, the Chicago, Burlington & Quincy, which last year carried more than one-third of the total Chicago shipments, while in 1872 it carried but 21¼ per cent. of

them. The Illinois Central, which carried but 6,081,000 less than the Burlington in 1872, had 256,000,000 less last year, and carried indeed nearly a fourth *less* than in 1872, having 19¼ per cent. of the whole then and only 6¾ per cent. last year. The Northwestern last year carried little more than a fifth as much and the St. Paul not one-seventh as much as the Burlington last year, though their railroad systems are larger.

The explanation of these great changes is that the Northwestern, the St. Paul and the Rock Island now supply the country on their lines west of the Mississippi very largely directly from Northern Wisconsin and Minnesota, whose lumber production was comparatively small in 1872, and was marketed, south of Minnesota, chiefly by the Mississippi River. At the same time, a large business has been developed in supplying interior towns (more to the south than to the west, however), directly by rail from the Michigan mills. In a word, a much smaller proportion than formerly of the total Western supply of lumber goes from Chicago now. A not inconsiderable amount is brought from Mississippi north by the Illinois Central Railroad.

If we sum up the Chicago receipts *by the six railroads which had termini there in* 1872, we shall find the following aggregates in 1872 and 1884:

	1884.	1872.	Increase.	P. c.
Miles railroad	11,599	4,318	7,281	168.6
Flour, bbls	2,537,284	1,457,271	1,080,013	74.1
Wheat, bu	18,130,410	12,396,811	5,733,599	45.4
Corn, bu	50,581,840	46,361,424	4,220,416	9.1
Oats, bu	30,519,735	14,173,333	16,346,402	115.3
Flour and grain, bu	110,649,763	79,489,287	31,160,476	39.2
Cattle, No	1,352,248	669,212	683,036	102.0
Hogs, No	4,125,701	3,360,848	764,853	22.7
Coal, tons	1,321,598	550,496	771,102	140.0
Lumber, M ft	697,171	342,050	355,121	103 8

The gains in most traffic are large, but they are in every case much smaller than the increase in the mileage of the railroads, the nearest approach to the gain of 168 per cent. in the latter being 140 per cent. in coal, 115 in oats, 104 in lumber and 102 in cattle. The aggregate of the three principal grains and flour has increased but 39 per cent. Per mile of railroad, these roads delivered 9,540 bushels of wheat, corn, oats and flour in Chicago in 1884, against 18,407 bushels in 1872; of cattle 117 head and of hogs 356 head in 1884, against 155 and 778 in 1872.

Thus, were we to judge of the Chicago railroads by the quantity of produce which they deliver at Chicago, we should have to conclude that the vast extensions which they have made in the last 12 years were, so far as they are concerned, a great mistake. But the chief value of the above investigation is to show that they are *not* to be judged by their Chicago traffic, and especially not by their deliveries of farm produce at Chicago. The extension of agriculture in the states which these roads serve has been great indeed. The production of leading articles in them (Illinois, Wisconsin, Minnesota, Dakota, Iowa, Nebraska, Missouri and Kansas) in 1872 and 1884 was:

	1884.	1872.	Increase.	P. c.
Wheat	237,200,000	104,800,000	133,400,000	127.3
Corn	1,049,374,000	492,746,000	556,628,000	113.0
Oats	350,692,000	114,262,000	236,430,000	207.0
Three grains	1,638,266,000	711,808,000	926,458,000	130.0
Hogs	18,667,500	11,756,000	6,911,500	59.0

We must not compare this with the increase in mileage of the six Chicago railroads, however, but with the increase in the total mileage of these states, which has been:

	1884.	1872.	Increase.	P. c.
Miles railroad	39,369	20,950	18,419	88.0

Thus the grain production of this territory has increased much more than its railroad mileage, and the total receipts of grain at Chicago have increased but little less than the grain production. This points to one of the causes why the railroad mileage of the companies considered has increased so much more in proportion than the traffic which they carry to Chicago. Their gain in mileage is largely made up of additions of road whose through traffic they carried to and from Chicago before they acquired them. This, however, is true of the Chicago Burlington and Quincy more than of any other road, and it is the one line which shows an enormous increase in its Chicago business. It is to but a small extent true of the Chicago & Northwestern, most of whose additions are new road, and it shows a comparatively slight gain in grain.

The fact is that, great as has been the agricultural development of this territory, its growth in other industries has been even greater. Its production, traffic and prosperity can no longer be judged by the receipts of grain and stock at its great market. In fact, it has developed numerous small markets, such as Kansas City, Omaha, Minneapolis, St Paul and Duluth. In the territory which these railroads traverse there are great interchanges which do not swell the traffic of any of the great markets. The shipments of produce to the South have very greatly increased, and the direct shipments of grain by rail from the farmers' stations to the East, most of which do not appear in the receipts of Chicago, have grown up almost entirely since 1872. In Illinois, Wisconsin, Eastern Minnesota, Iowa and Missouri, the growth of population has been almost entirely in the towns, and the increase in production has been much less in farm products than in other products. And this becomes more and more so every year, so that the movement of farm produce, much more its movement to any one great market, becomes less and less a fair basis for estimating the traffic of the West and the Western railroads.

Lake and Rail Grain Shipments.

Last year was thought to be a trying one for vessels engaged in the navigation of the Great Lakes, rates being very low and traffic very light. But compared with this year it was a prosperous season. For the nine weeks ending Oct. 3 this year, and the corresponding weeks of 12 previous years the shipments of grain by rail and by water from the eight Northwestern markets have been as follows, in bushels:

Year.	By rail.	By water.	Total.	P. c. by rail.
1873	5,821,300	29,414,700	37,236,000	15 6
1874	5,146,500	24,517,500	29,664,000	17.4
1875	11,037,000	21,403,200	32,440,200	34.0
1876	14,754,600	21,024,800	35,779,400	41.2
1877	9,211,400	34,614,900	43,826,300	21.0
1878	11,331,300	38,695,900	50,027,200	22.5
1879	14,386,500	36,434,800	50,821,300	28.3
1880	18,002,800	37,207,100	55,209,900	32.6
1881	21,518,100	25,244,000	46,762,100	46.0
1882	17,935,900	24,074,000	42,009,900	42.7
1883	20,89 ,900	36.364,200	57,264,100	36.5
1884	18,640.700	29,904,900	48,545,600	38.4
1885	23,353,612	22,591,620	45,945,232	50.8

The total shipments for these two months after harvest were the smallest since 1877, with the exception of 1882, but only a trifle less than in 1881, and but 5½ per cent. less than last year, but the shipments by water were less than in any other year since 1876, less than in 1873 or 1874, and 24 per cent. less than last year. The rail shipments, on the other hand, were larger this year than ever before, 10 per cent. more than in 1881, when also a railroad war was raging, and 5,350,000 bushels more than in 1880, though the total shipments were 10,735,000 bushels less than this. This year the railroads carried more than half the grain shipped, in spite of the lowest lake and canal rates ever known; while last year they carried only about three-eighths of it, and never before more than 46 per cent. The contrast is very great with the years 1873 and 1874, which may be said to have been before the time when the railroads ventured to compete with the lakes and canal for grain destined to places not distant from the canal or its terminus. In 1873 the total Northwestern shipments were but 8,700,000 bushels less than this year, but the rail shipments were 17,500,000 less; since then there has been an *increase* of 301 per cent. in the rail shipments and a *decrease* of 23 per cent. in the water shipments.

The very large rail and the very small lake business this year is doubtless chiefly due to the extraordinarily low rail rates, which were never before equaled at this season of the year, and only once or twice before at any season, if at all, for probably rates touched a lower point in September than ever before for considerable shipments. The effect of the rates is shown by the fact that in August, when probably little was carried at less than 15 cents per 100 lbs., Chicago to New York, the railroads in no week had as much as half of the grain; but in September, when 10 and 12 cents were the prevailing rates, they carried considerably more than half of it. The figures for the four weeks to Aug. 29 and the five weeks to Oct. 3 are:

	4 weeks to Aug. 29		5 weeks to Oct. 3	
	Bushels.	P.c.	Bushels.	P.c.
By rail	7,394,567	42.4	15,959,045	56.0
By Miss. River	587,857	3.4	496,804	1.7
By lake	9,436,440	54.2	12,070,519	42.3
Total	17,418,864	100.0	28,526,368	100.0

The effect of the low rail rates on lake shipments is shown better by this, we think, than by the comparison with last year, because there would probably have been some increase in the proportion carried by the railroads this year in any event. The lakes compete much more effectively for the export grain than for that consumed in the East—very little for that going to interior Eastern points, except a few directly on the canal. Now, the exports have been very much less this year than last. For the eight weeks to Oct. 3 the clearances for Europe amounted to but 12,690,397 bushels this year, against 18,537,181 last year. Thus there has been more grain this year which the railroads would naturally carry—would have carried at a 20-cent rate as well as at a 10-cent rate.

One of the effects of the reduced rates and the reduced traffic on the lakes has been the laying up of some of the vessels two or three months before the close of navigation. It may be thought that this will give the railroads a larger share of the business now that rates have been advanced. There is not, however, the slightest probability that there will be any lack of vessels, but there is a certainty that the railroads have supplied many interior points with grain in September at a 10-cent rate, which, if they had not made so low a rate, would have taken their supplies later in the season at a 20 or 25 cent rate. That is, they have spoiled a large amount of good business for themselves as well as for the lake vessels. Their business for the remainder of the fall and for the winter will be the worse because of what they did in September. They made the business artificially large for a month by carrying it for less than cost, and they have reduced the traffic for the rest of the year by so much, part of which reduction will fall on the vessels and part on themselves.

The Crops of 1885.

The Department of Agriculture reports for Oct. 1 that the average condition of corn is higher than in any other year since 1879, indicating a yield of fully 26½ bushels per acre for the country, against a little less than 26 bushels last year. This average yield will give a crop of 1,957 *millions* of bushels, against in previous years:

1879.	1880.	1881.	1882.	1883.	1884.
1,755	1,717	1,194	1,617	1,551	1,796

The increase over last year by this estimate is 161 million bushels, or nearly 9 per cent., the acreage being 6 per cent. greater.

The Department estimates the average yield of wheat to have been about 10½ bushels per acre harvested, which later probably did not much exceed 34 millions of acres, and was nearly 4 millions less than the area sown. This gives a crop of something more than 357 millions of bushels against in previous years:

1879.	1880.	1881.	1882	1883.	1884.
459.5	498.5	380.3	504.2	421.1	512.8

The decrease from last year is thus 155.8 million bushels, or 30 per cent.—nearly the same in number of bushels and probably more than twice as great in value as the increase in corn.

The estimate for cotton may be changed if the conditions after Oct. 1 vary from an average, as favorable or unfavorable weather still has an effect on the production. With average conditions hereafter, an average production of 0.3675 bale per acre is estimated, making a crop about 1,000,000 bales more than last year, or about 6,700,000 bales—more than in any previous year except 1882, but produced from a much larger acreage than in that year or any other year.

The crop of oats is reported to be more than 600,000,000 bushels, the yield being nearly 28 bushels per acre.

The crop heretofore, in *millions* of bushels, has been:

1879.	1880.	1881.	1882.	1883.	1884.
407.9	417.9	416.5	488.3	571.3	583.6

There is thus a small gain over last year.

Rye seems to have shared the fate of wheat, the average yield being 10.4 bushels per acre, which is two bushels less than last year. This gives a crop of 22,400,000 bushels, against 28,000,000 last year, equivalent to a decrease in wheat of about the same amount.

Barley gave an average yield of about 22 bushels per acre, making the aggregate about 53,400,000 bushels and slightly greater than last year.

On the basis of these estimates the cereal crops this year amount in the aggregate to just about 3,000 millions of bushels, against in previous years:

1879.	1880.	1881.	1882.	1883.	1884.
2,686	2,704	2,034	2,688	2,622	2,969

Though the number of bushels is even slightly greater than last year, the value is much less at the same prices, as there is a great reduction in the high-priced grain, and the increase is in the low-priced corn and oats. The *acres* harvested apparently were about 135,800,000, which is not quite 1½ per cent. more than last year, and much less than the rate of increase in population. But the acreage this year was considerably reduced by the winter-killing of wheat. The Department estimates that nearly 4,000,000 acres sown were not harvested. Most of this, doubtless, was planted with other crops last spring, but a considerable amount, doubtless, lay fallow, so that the increase in acres harvested was less than in acres brought under cultivation.

The increase in cotton and corn this year may be said to about balance in value the decrease in wheat, so that on the whole this year's crops are about equal to last year's. But this year's crop will hardly afford as much transportation as last year's, as a much smaller proportion of corn than of wheat is sent to market. However, the crop movement during the crop year may very easily be as great this year as last, because not a little of last year's crop, especially of corn, is likely to be marketed this year. An increased live-stock movement is almost certain, largely due to last year's corn crop, and in the aggre-

gate there may be more transportation of farm produce in the year ending with July this year than last. But the traffic in some districts and on certain railroads may differ greatly. It is to be said that the lines which are suffering from the great decrease in winter wheat are to a great extent just those lines which are likely to profit by the heavier movement of corn and hogs which is to be expected. The effect of the wheat has already been felt to a great extent, winter wheat going to market largely in July, August and September, and being mostly delivered before January, while the effect of the corn crop is not felt much till October and not fully till January.

It is reported that a well-known railroad man left New York for China last Wednesday with large amounts of American capital pledged to build railroads there if satisfactory franchises can be obtained. This is the second important indication that this country has become too small a field for the investment of its capital, the first being the construction of the Mexican railroads by American enterprise. There is very good reason for believing that Americans can supply the Chinese with the kind of railroads they need on better terms than Europeans, and it is desirable that we should find an outlet there for our capital and skill. Nowhere in the world are there so many men experienced in constructing railroads rapidly, skillfully and cheaply, for the reason that nowhere in the world have so many railroads been built in a short time. The construction of 35,000 miles of railroad in the United States in the four years from 1880 to 1883 trained an army of engineers and contractors and manufacturers of rolling stock and materials; and we could easily spare the force (aside from laborers) needed to give China all the railroads it needs or can pay for. But the country which supplies the capital is likely to dictate the methods of construction and supply the materials, if it can supply them cheaply, and heretofore we have seldom been ready to supply the capital. In a country like China, more than in most others perhaps, the influence which comes from long and intimate acquaintance through merchants and government representatives probably has more effect than elsewhere; and in this doubtless England has a great advantage. But Americans ought to try to get a share of what railroad building is done there. If they can once get a chance, and act with reasonable prudence and restraint, they can give the Chinese what they need more cheaply than any other people, and serve themselves and China at the same time.

The Michigan Railroad Commissioner has adopted the absurd rule for the distinction between through and local traffic which prevails in some other states, namely, that shipments billed and passengers ticketed from stations in one state to stations in another state shall be reported as through, except when both places are on the lines of the same railroad company; and all other traffic will be reported as "local." According to this, the traffic between Chicago and Buffalo or Chicago and Detroit on the Michigan Central will be "local," and if all the railroads of the country were under one management there would be no such thing as through traffic. The division of business in this way makes the reports of through and local business utterly valueless for any purpose whatever. It seems to have been adopted in order to have a "general rule" and save making special rules. But there is no need of a general rule, and the business of each railroad should be considered separately in determining what shall be considered "through" and what "local." It would be well to have shipments on the Wabash from Kansas City to Chicago, from Kansas City to St. Louis, from St. Louis to Chicago, from St. Louis to Detroit or Toledo, from Indianapolis to the same places, and on some other routes counted as "through"; but the Michigan rule would make it all local, except when received from or consigned to the lines of another company, while shipments from a local station in Ohio or Indiana on a connecting railroad to a local station on the Wabash in Michigan—purely local traffic in most cases—will be reported as "through."

The lumber manufacturers of the Northwest have addressed a resolution to the railroad companies, complaining of the fluctuations in lumber rates, and asking that changes be made not oftener than once in three months. The manufacturers (and dealers) have good reason to complain, though the frequency of the changes is probably less harmful than the great irregularity in them. One month it may cost a Wisconsin mill $2 a thousand more than the Chicago yard to deliver lumber in Kansas City or Omaha; the next month the Wisconsin mill may have the advantage, and under these circumstances it is not possible to determine what business can be done to advantage a week beforehand. But this is only the result of the same sort of competition among the railroads that exists among the lumbermen. The railroads deprecate it, just as the lumbermen deprecate their own competition when it destroys the profits of their business; and they make frequent efforts to avoid it, in their own interest, with somewhat better success than would be possible with the lumbermen, but with frequent failures which destroy their own profits and make the lumber business very uncertain. It is, however, much easier to make the fluctuations of railroad rates moderate and infrequent than to prevent free competition among lumbermen; and the former is desirable as well as probably practicable, while it is not desirable to prevent the free competition of lumbermen. But as the railroads have themselves a great interest in effecting what the lumbermen desire them to do, and as notwithstanding this they have so far not been able to effect it except very imperfectly, we shall not expect to see any great change in response to the lumbermen's request.

The General Manager of the Cincinnati, Washington & Baltimore road, which is the Baltimore & Ohio's Cincinnati connection, makes a striking statement of the reduction of the value of through trunk line freight traffic in his report for 1884, in these few figures:

Ton-miles:	1884.	1880.	Decrease.	P. c.
East-bound	46,780,000	80,311,000	33,531,000	41.8
West-bound	20,389,000	25,789,000	5,400,000	20.9
Total	67,169,000	106,100,000	38,931,000	36.7
Rates:				
East-bound	0.490 ct.	0.737 ct.	0.247 ct.	33.7
West-bound	0.814 ct.	0.941 ct.	0.127 ct.	13.5
Total	0 589 ct.	0.787 ct.	0.198 ct.	25 2

Thus there has been at once a great reduction in the traffic and a great reduction in the rates received for carrying it. Computation shows that the *earnings* from this traffic at these rates were:

	1884.	1880.	Decrease.	P.c.
East-bound	$229,222	$591,892	$362,670	61.3
West-bound	165,956	242,674	76,718	31.6
Total	$395,178	$834,566	$439,388	52.7

Thus the earnings from the through freight have been reduced more than one-half since 1880, and this reduction alone is at the rate of $1,540 per mile of road, which would go far toward payment of interest on some of the many income bonds of this company. The earnings from through freight last year were nearly 37 per cent. of the total freight earnings.

The Manhattan Railway Company, which works the elevated railroads in New York city, has had the following earnings in successive fiscal years:

Year ending Sept. 30—					
1880.	1881.	1882.	1883.	1884.	1885.
$4,612,976	$5,311,076	$5,973,633	$6,386,506	$6,711,409	$7,000,567

Meanwhile the numbers of passenger journeys have been:

Year.	Passengers.	Year.	Passengers.
1879-80	60,831,757	1882-83	92,124,943
1880-81	75,585,778	1883-84	96,702,620
1881-82	86,361,029	1884-85	103,334,729

There was last year compared with the year before an increase of 7 per cent. in the travel and of 4 per cent. in the earnings.

The increase in passengers was greater than the year before, and about the same as from 1882 to 1883, but considerably less than in the other two years. The increase last year was owing to a reduction of fares all day Sundays to 5 cents, by which it is said that earnings were reduced $100,000; as the average fares before the reduction was about 7 cents, this indicates that the Sunday travel was increased less than 40 per cent.

The increase in passengers since 1881 has been nearly 37 per cent. and in earnings 32 per cent. Even with the rate of growth of the last two years (12.2 per cent.), there would be 181 million passengers in 1895, or three-fourths more than than last year.

The lower house of the Georgia Legislature on the 9th inst. voted down the bill to amend the Railroad Commission laws. The proposition was to restrict the power of the Commission over rates to cases where complaint is made against the rates made by the railroad companies, and in these cases give the companies an appeal to the courts. The bill received 83 votes, while 88 were required to pass it.

Two Important Engineering Works.

The week has been remarkable for the completion of two important works for water navigation: the Davis Island dam below Pittsburgh, and the blowing up of Flood Rock, at Hell Gate, in New York harbor. The first is a dam of such peculiar kind that while at low water it is an effective dam some 12 ft. high, backing up the water so as to be navigable for some distance above it, and connected with a lock 600 ft. by 110 ft. in the clear for passing boats, at high water the whole affair is dropped bodily to the bed of the river, leaving unobstructed navigation over it. It has cost some $900,000, and is expected to be of great advantage to the Pittsburgh coal trade, especially in enabling boats to be loaded in anticipation of high water.

The Flood Rock explosion was a far more dramatic affair, although it has cost to date, it is unofficially stated, only about $100,000 more. A total of some 300,000 lbs. of rackarock and dynamite blew into fragments a roof of rock containing some 275,000 cubic yards, covering a reticulated cavern from which 80,166 cubic yards had been removed by tunneling; the explosion being many times the greatest which has ever occurred, and yet seeming to those who stood nearest to it almost noiseless. The throwing up of nine acres of water, however, from 50 to 200 ft. was a truly grand sight. As was to be expected, if the explosion were truly successful in shattering the mass, the bulk of the rock was little, if any, decreased, and it shows at points above water as heretofore, from which the fear is expressed by some of the newspapers that the explosion cannot have been completely successful or the whole rock would have sunk out of sight. As rock in place expands some 50 per cent. in volume when completely broken up, however, so that the 275,000 cubic yards of the roof should expand so as to fill 137,500 cubic yards more space, while there was only 80,166 cubic yards of vacant space beneath it, the only unfavorable indication is that the exposed points (which seem to be well shattered) do not show above water rather more than they do. The pieces of rock are probably, as intended, very large, but that does not ordinarily affect greatly the volume of the shattered mass.

Although the explosion is by far the largest on record in the amount of explosives used, it has been exceeded on at least one occasion in the amount of material moved at one blast, while others have closely approached it. Perhaps the greatest explosion in this respect which has ever occurred was at Dover, England, where a chalk cliff, 350 ft. high, was blown away by 19,000 lbs. of gunpowder, to obtain a road-bed for a railroad, some 550,000 cubic yards being shaken down. Another very recent blast, on the line of the St. Louis & Iron Mountain Railroad, resulted in the dislodgement and fracture of a mass of some 220,000 cubic yards of granite with some 11,000 lbs. of powder, exploded in a T shaft 65 ft. deep. Some of the blasts on the Peruvian roads likewise were of immense magnitude; but none of these are fairly comparable with the Flood Rock explosion in an engineering sense.

Neither is the total volume of rock handled especially remarkable, even for a single work. Thus, on the North British Railway there is a single cut some 6½ miles long and 20 to 35 ft. deep, which contains over half a million cubic yards. This is perhaps the largest single cut in the world, and it is safe to say that very few at all like it are built now-a-days. A peculiar feature of it is that the cut is so long and the gradient (1 in 960, or 5½ ft. per mile) so slight that the greatest difficulty is experienced from bad drainage, while as the ground is side-long, had the line been thrown over a little to one side, the whole of it could have been avoided. This is one of the many cases where a part of the great cost of early English railroads can be shown to have been thrown away in unnecessary expenditures which did little to increase the value or excellence of the property, if, indeed, as in this case, they did not decrease it.

The fact that so new an explosive as rackarock—which is simply chlorate of potash mixed with di-nitro benzole—should have been the chief explosive used (the dynamite being only about one-ninth of the whole and chiefly used to explode the rackarock) must have been a surprise to many, and is certainly a striking testimony both to its power and reliability. An important motive was probably greater safety and convenience, in that it could be mixed on the spot immediately before charging the holes and no considerable stock kept on hand, but the government engineers estimate its strength at 95 per cent. of that of No. 1 dynamite.

Present Tendency of the Iron Market.

The President of the Catasauqua Manufacturing Company, Mr. Oliver Williams, in answer to an inquiry as to business prospects, has given us the following opinion, which he permits us to publish, as to the prospects of the car, bridge and merchant iron trades. It is more hopeful than most such responses:

"The demand as compared with one year ago is about the same. In September of last year we had about two months' orders ahead on our order books, and we have about an equal amount now. In car irons all of our orders this fall are for repair work, very few if any new cars being built by the Eastern Pennsylvania or New Jersey railroads. Bridge irons are in active demand, as usual at this season, bridge builders being anxious to get their contracts finished before bad weather. As compared with the spring demand for iron, it is certainly about one-third greater now than then. In bar, angle and other shapes of iron, the prices of this year are from one to two-tenths of a cent per pound less than twelve months ago, and they are now (Sept. 23) as low as at any time this year; but prices are no longer weak, as they were prior to August, but are very firm, with a tendency upward. In plate and sheet irons prices are exceedingly strong, with a number of mills declining to sell, except at an advance of from one to two-tenths on the lowest prices of July.

"The present demand being entirely legitimate, with no taint of speculative buying, will continue with slight advance in prices until December. Naturally the demand will then slacken and prices weaken until March or April, when, unless interfered with by adverse legislation, the iron and steel trades will have a revival of demand that will require the full productive capacity of the country to supply, and at prices that will be remunerative.

"My reasons for this prediction are based upon a long and active connection with the iron trade, and a very careful ob-

servance of the conditions of the country. They are simply a prediction, but I would ask you to stick a pin in them for future reference."

The Last Patent Office Report.

The annual report of the Commissioner of Patents, which has recently appeared for the year 1884, can hardly be called interesting reading. There is much the same difficulty in getting "the hang of the story" as in reading a dictionary. Nevertheless, even a dictionary has an interest of its own; and after making all allowances for the folly which swells its bulk, the Patent-Office Report is an impressive monument to the inventive fertility of this country which well repays some study.

The report shows a total of 20,413 patents and reissues, about 8 per cent. less than last year, and a little over the total the year before, and in this total hardly any conceivable device is wholly unrepresented by some new patent. The largest number by far taken out for any one purpose, as some of our readers have had reason to suspect, is for car-couplers, there having been no less than 283 additions last year to the little army of 3,500 illustrious predecessors. Among the devices connected with railroad work, for which the greatest numbers of patents have been issued, are these:

Air brakes	18	Car starter	22	Nut-locks	60
Air compressors	10	Stock cars	11	Railway crossing gate	13
Axles (car)	5	Car wheels (with 14 related patents)	30	Railway gate	11
Axle-box (car)	19	Chucks	31	Automatic gate	3
Journal box (car)	12	"Fence"	27	Railway engine	34
Bearings	18	Wire and iron fence	26	Railway switch (with 19 related patents)	16
Journal bearings	15	Fence posts	25	Railway tie	12
Belt fasteners	17	Fence wire	50	Rock drills	36
Brake-shoes	7	Fence wire machines	20	Snow plows	13
Car brake	66	Lifting jacks	48	Spark arresters	25
Car coupling	283	"Locomotive"	10	Steam boilers (with 33 related patents)	31
Dump cars	13	Locomotive ash-pan	8	Switch stands	7
Car heaters	5	Lubricators	55	Car trucks	19
Car platform	6				
"Railway cars"	17				
Car replacers	7				
Car roof	6				
Car spring	7				

With nearly all of these the wonder is that there should be so many rather than so few; but there are not a few heads under which, especially by comparison with others, one is astonished to see so few. In fact, there is a singular lack of relation between the apparent difficulty and importance of the end and the number of patents issued to attain the end. This incongruity, at least, does not exist in the matter of car-couplers; for the importance of the end is sufficient to justify any necessary amount of effort; but what can be thought of such a superabundance of inventive genius as is shown by the patenting of five new "bricks" (not ways of making bricks, for which there are 102 more patents); five new "boots," 18 "boots or shoes," 19 "shoes"; and others, as in this record:

Brick	5	(with 100 related patents.)		Plow	60
Boot	5			Pipe-coupling	13
Boot and shoe	18	Churn	51	Saw	37
(with 200 related patents.)		Coffin	11	Screw-driver	17
		Friction clutch	20	Sash holder (or sash fastener)	67
Shoe	19	Horse collar	15		
Bottle stopper	36	Horse shoe	21	Thill coupling	57
Roller skate	46	Cork-screw	16	Weather-strip	22
Button	35	Curtain fixture	58	Wrench	28
Button fastener	50	Fire escape	190	Etc., etc.	
		Horseshoe	21		

On the other hand, the following, where there would seem to be still plenty of room for further invention, have but very few patents each; an evident explanation being, with most of them, that it takes some little experience and knowledge even to imagine one has invented an improvement:

Bessemer converter	3	Headlight	3	Elevated railway	1
Bessemer plant	2	Locomotive boiler	2	Railway frog	4
Caissons	3	Locomotive brake	3	Railway rail	4
Car running gear	2	Other locomotive patents	22	Railway joint	11
Car seat	3	Electric railway	7	Railway cross-tie	3
Sleeping car	3			Stone crusher	5
Car unloader	1			Type writer, etc.	23

Two of the three caisson patents are by men who ought to know something about them, Henry Flad and J. E. Robinson; and one of the six bridge patents is by Theodore Cooper. Most of the other names we do not recognize.

Among the leading large classes of inventions there are:

Car-couplers	283	Electric machines and conductors	390	"Railway" patents	287
Brick patents	105	Electric lamps	110	"Sewing machine" patents	251
Button patents	185	Locomotive patents	55	"Telephone" patents	190
All car and car-wheel patents except car-couplers	340	Mechanical movement	46	"Valve" patents	200
Cultivator	124	Plows	170	"Vehicle" "	200
Valves and cut-offs	224			Total of all patents	20,297

This list includes only those patents which have the word given in their title. The car and locomotive patents, for example, do not by any means include all those which relate to cars or locomotives; such as spark arresters, window fasteners, etc., which are separately classified under many different names. The small number of locomotive as compared with car patents is a noticeable feature; as also the immense number of patents on almost every form of agricultural implement.

The great numbers of patents which are sometimes taken out by a single person in one year is another curious feature. A very large proportion of the patents, nearly, if not quite 25 per cent., appear to be issued to men who take out from two to fifty patents every year. The electric patentees are by far the most conspicuous for their fertility, Mr. E. Weston appearing to lead the list with 35 (a number, however, which has been much exceeded in past years); and one Thomas A. Edison, of Menlo Park, N. J., following not far behind with 27. In fact, it is hard to find an electrical patent issued to a man who contents himself with one per year, and very many take out from 6 to 20. Of the railroad patentees we find no one with more than Mr. E. J. Brooks, who has made in the past year 12 different inventions or discoveries of car-seals; but Mr. George Westinghouse has six and Mr. H. H. Westinghouse three others, while Col. R. S. Vose has invented or discovered four new car springs. The Yale & Towne Manufacturing Co. has eight patents, the Union Switch & Signal Co. five, the Pintsch lighting interest three; Mr. John Gjers, of England, has six patents for "apparatus to equalize the temperature of steel blooms," which, if they will do anything to eliminate the pewter-like qualities of much of the steel now rolled, we sincerely trust will secure rapid and early introduction.

The total number of patents and reissues taken out during 1884 amounts to one to every 2,788 inhabitants (men, women and children), taking the average population of 1884 to be 56,940,000. The report includes also the number of patents issued in each year since 1837; the striking ratio of increase in which, as one of the elements of our industrial progress, is shown below:

Year.	No. patents.	Pop. per patent.	Year.	No. patents.	Pop. per patent.
1840	473	36,000	1865	6,616	5,270
1845	504	39,500	1870	13,333	2,890
1850	993	23,400	1875	14,837	2,970
1855	2,012	13,400	1880	13,947	3,700
1860	4,778	6,600	1884	20,413	2,788

By single years since the war began, the number of inhabitants per patent granted has been:

1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.
6,600	9,610	9,280	7,960	6,800	5,270	3,760	2,780

After these years the rapid increase of ratio of patents to inhabitants ceased, and the ratio remained more nearly constant for nine years, as follows:

1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.
2,770	2,690	2,890	3,030	2,980	3,240	3,150	2,970	2,900

Between 1876 and 1880 the proportion of patents fell off, but it has increased more than ever before of late, the number of inhabitants per patent being:

1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.
3,260	2,540	3,700	3,590	3,200	2,780	2,470	2,790

Perhaps a greater increase in inventions than in population was to be expected, because a larger and larger proportion of the population are engaged in mechanical pursuits. It is also much more common now than formerly to take out patents for unimportant inventions, in the hope that some future invention may make them valuable, or to prevent their use by some one else who might by its aid compete more effectually in the manufacture of some machine or apparatus. Nevertheless, the rate of increase since the days before the war is certainly extraordinary.

The report gives a table showing the number of inhabitants in each state to each patent granted to a resident of that state, from which it appears that:

Connecticut leads all the states in the record of patented inventions, having only 694 inhabitants per patent. Massachusetts and Rhode Island have about 900 and the three northern New England states 2,900 to 4,400.

New York and New Jersey have 1,250. Pennsylvania, Delaware and Maryland about 2,400. This also is the average of the four great states east of the Mississippi and north of the Ohio, recently wholly agricultural and now largely industrial.

In the Southern states there is a marked falling off. West Virginia, Texas and Kentucky lead the list with 8,300 inhabitants per patent. North Carolina foots the list of all the states and territories with 24,133, and the nine remaining states range from 10,560 (Louisiana) to 18,300 (Alabama), averaging about 15,000. This seems low, but it is no lower than the average of the whole country in 1854, and the South is probably on the average less an industrial country than the average state was in 1854. Nearly all the inventions are by white men, and the *white* population per patent is very much less than is given above.

The states from Wisconsin and Missouri to the Pacific average about alike, 4,000; California and Colorado being high, 1,700; and Kansas and Nebraska low, 5,000 and 6,400.

Too much significance may be easily attached to these figures, yet as an index of industrial progress they have their significance.

The more recent condensed profiles of the New York, Pennsylvania & Ohio Railroad are a very good example of the compression of a large amount of information in a small space, and a considerable improvement on the form which we illustrated in our issue of Feb. 6, of this year.

The horizontal scale is 12,000 ft. per inch, or a little over ¼ in. per mile, instead of 4,000 ft. per inch; and the vertical scale 200 ft. per inch, instead of 150. Either plan gives a very good ratio to show distinctly differences of grade without undue exaggeration, but the horizontal is a little crowded to show such details as the position of structures clearly; although they are all shown, by appropriate signs rudely representing the structure. For making a profile of a single division, or even two or three only, a larger scale is no doubt best, but for a lithographed profile for general use the smaller scale of these profiles answers a very good purpose. Every one of the following details is indicated by separate signs: stations, water-tanks, bridges and their number, and whether of iron, wood, plate-girder or small truss girder, and whether through or deck; trestles; railroad and highway crossings, grade and under or over grade; farm crossings; junctions; culverts, open, box and arch, and the degree, position and direction of every curve. Above the profile are written descriptions of the water supply and bridges, and below it small scale maps of each yard and siding, with lengths of the latter in figures to a scale of 2,000 feet per inch, which latter scale, however, is painfully small for the amount of detail which it is attempted to give.

The large decrease in the Chicago, Burlington & Quincy earnings in August ($223,191, or 9 per cent. in the total), was in all branches of traffic reported; but there was only a very small decrease in passenger earnings, namely $12,611, or 2½ per cent., while the average decrease in these for the previous months of this year had been $26,260 (9 per cent.). The decrease in freight earnings was nearly 10 per cent., while for the seven months previous there had been an increase of 5¾ per cent., and there was the very large decrease of 20 per cent. in the miscellaneous earnings, which had previously shown an increase of 12 per cent. this year, but which were extraordinarily large in August and two months following last year. The smallness of the decrease in passenger earnings is favorable, and makes it probable that the large decrease in freight was due to temporary causes.

The earnings from the different sources for the last three years for the month of August and for the eight months have been:

August.	Passenger.	Freight.	Other.	Total.
1885	$487,706	$1,602,502	$134,096	$2,224,303
1884	500,316	1,778,652	168,525	2,447,494
1883	538,373	1,847,703	109,047	2,495,124
Eight months:				
1885	3,245,375	12,101,026	1,063,704	16,410,105
1884	3,441,811	11,377,622	979,282	15,798,715
1883	3,295,748	11,628,513	800,770	15,725,031

Thus the decrease in passenger earnings in August was three times as great from 1883 to 1884 as from 1884 to 1885, and for the eight months these earnings were nearly as great this year as last; but the decrease in freight earnings in August was 2½ times as great this year as last, while for the eight months there is a considerable increase (6½ per cent.) this year, against a small decrease last year. The miscellaneous earnings in August, though $34,429 less than last year, were $25,049 more than in 1883. For the eight months these increased $178,512 from 1883 to 1884, and again $84,422 from 1884 to 1885.

The quarterly report of the *Iron Age* shows that the furnaces in blast, Oct. 1, had an aggregate weekly capacity of 71,608 tons, against 72,081 tons July 1, 74,840 April 1, 66,747 Jan. 1, and 72,618 tons Oct. 1 last year. While there are 225 furnaces in blast, 443 are out of blast, and the aggregate weekly capacity of the latter is 100,575 tons, or 40 per cent. more than that of the furnaces in blast. The average weekly capacity of the furnaces in blast is 318 tons; that of those out of blast, 227 tons. The number of furnaces in and out of blast Oct. 1 for the last eight years has been:

	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.
In blast	251	337	424	435	443	340	234	225
Out of blast	454	347	302	293	276	365	462	443
Total	705	684	726	728	719	705	696	668

This shows the rise and the decline of the business. The average capacity of furnaces has probably increased decidedly since 1878, and though there seems to have been but little change in number, there was probably a large increase in their aggregate capacity from 1878 to 1882, and the 668 now reported can probably turn out much more iron than the 705 reported in 1878. The business seems to have been nearly stationary this year, with about half as many furnaces in blast as in 1882, when the number was largest.

Chicago through shipments, eastward for the week ending Oct. 10 and the corresponding week in previous years have been as follows, in tons, only flour, grain and provisions being included this year, but all freights in previous years:

1880.	1881.	1882.	1883.	1884.	1885.
34,476	56,995	34,790	44,926	55,640	55,460

Thus the receipts this year were very nearly the same as last year, but, allowing for the higher class freights not reported this year and last, they were much larger than in any previous year. The very large shipments last year were due to an announcement of an advance from about 15 cents (cut) to 25 cents. This year, doubtless, the advance of Oct. 1 had a similar effect, the shipments last week being chiefly of freight contracted at the old rates.

The shipments for each of the last six weeks and the percentage of the total going by each railroad have been:

	Week ending.					
	Sept. 5.	Sept. 12.	Sept. 19	Sept. 26.	Oct. 3.	Oct. 10.
Tons:						
Flour	2,182	3,913	4,990	5,054	6,052	10,359
Grain	22,835	30,986	35,208	40,034	44,776	36,288
Provisions	10,005	13,262	11,863	9,669	11,591	8,813
Total	35,022	48,161	52,161	54,757	62,419	55,460
Per cent.:						
C. & Grand T	8.1	5.2	6.9	16.3	16.5	7.2
Mich. Cen	19.2	20.7	25.3	24.8	23.3	23.0
Lake Shore	19.7	22.5	19.7	16.2	18.0	20.5
Nickel Plate	9.7	11.9	8.8	10.0	12.6	10.8
Ft. Wayne	14.9	11.4	15.6	12.9	11.2	17.9
C., St. L. & P	9.5	12.2	12.5	7.9	7.7	10.3
Balt. & Ohio	6.1	6.7	5.2	6.0	7.7	7.1
Ch. & Atlantic	12.8	9.4	6.0	5.0	3.0	3.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

Thus the total shipments last week were 11 per cent. less than the week before, but larger than in any previous week. While there was this decrease in the total, there was an increase of 70 per cent. in the flour shipments, and decrease of 24 per cent. in provisions and 19 per cent. in grain. The flour shipments were the largest for months, indicating that the low rates had at last diverted the Minneapolis shipments from Lake Superior.

In percentages the Chicago & Grand Trunk experienced a sudden and great decrease from 16.5 to 7.2 per cent. of the whole, indicating that the shipments of the two weeks previous had been swelled by special causes. What it lost went chiefly to the two Pennsylvania roads, which carried 28.2 per cent. of the whole, against 18.9 the week before, while the three Vanderbilt roads carried 54.3 per cent., against 53.9 the week before. The Chicago & Atlantic again carried but an insignificant part of the business, probably not having made efforts to secure business at the unprofitable rates prevailing recently.

A large decrease of earnings is to be expected for this week, when substantially all the shipments should pay the new and

higher rates. Last year the shipments fell from 55,640 tons in the week to Oct. 9, to 36,777 the following week.

In the movement of wheat to the Northwestern markets for the week to Oct. 3, the greatest changes, compared with the previous week, were an increase at Chicago and a decrease at Duluth. There were also increases at Milwaukee and at two winter wheat markets, Detroit and Toledo. The receipts at Chicago were the largest since June, yet in most years would be called small, being only 18 per cent. of the total Northwestern receipts. The receipts at Milwaukee were also the largest since June. On the other hand, the St. Louis receipts were the smallest since July 11, and were quite insignificant, being only 7½ per cent. of the whole. The total movement was slightly greater than for two weeks previous.

The contrast between the receipts this year and last in September is striking. For the five weeks ending Oct. 3 they were, at each market, in bushels :

	1885.	1884.	Decrease.	P.c.
Chicago	1,415,095	3,933,985	2,518,890	64.0
Milwaukee	666,284	1,108,470	442,186	40.0
Duluth	2,815,047	3,234,456	415,409	12 8
Toledo	1,356,717	3,989,066	2,632,349	66.0
Detroit	1,814,859	2,055,507	240,648	11.7
St. Louis	1,331,555	2,634,964	1,303,409	49.5
8 N. W. markets	9,553,748	17,478,038	7,924,290	45.3

Comparatively, Detroit and Duluth have done best, the rate of decrease having been least at these markets. Toledo and Chicago have suffered most, each losing nearly two-thirds, while St. Louis received about half as much as last year.

The percentage of the total receipts of the eight Northwestern markets arriving at each of these six markets in September this year and last has been:

	Chicago.	Milwaukee.	Duluth.	Toledo.	Detroit.	St L.
1885	14.8	7.0	29.5	14.2	19 0	13.9
1884	22 5	6.3	18.5	22.8	11.7	15.1

Thus Toledo, which stood first in wheat receipts last year in September, and Chicago, which was next and close to it, each having then nearly a fourth of the whole, have a proportion of the whole one-third less this year—about a seventh each. Duluth, which stood third last year, this year is first, and with a long lead, receiving twice as much as the markets which exceeded it last year. Detroit, which was fifth last year, is second this.

The fine crop in Michigan, the failure of the winter wheat crop elsewhere, and the fair spring wheat crop west and northwest of Chicago explain all these changes except the great decrease at Chicago, but this is, perhaps, partly due to the lower rail rates this year and the increased shipments from Lake Superior ports. One would have supposed, however, that the Nebraska and Iowa crops, which were fair, would also have given Chicago more wheat than it actually received last month.

The Northwestern grain receipts have become quite respectable; but they are not large for the season. For the last six weeks reported they have been, in bushels :

Week ending					
Aug. 29.	Sept 5.	Sept. 12.	Sept. 19.	Sept. 26.	Oct. 3.
6,444,793	6.785,604	6,104,107	5,315,701	7,054,174	7,491,253

The shipments have not kept pace with the receipts, but have been :

Week ending					
Aug. 29.	Sep'. 5.	Sept. 12.	Sept. 19.	Sept. 27.	Oct. 3.
5,062,229	3,251,483	5,526,288	5,553,330	5,332,534	5,861,733

The proportion of receipts to shipments is rather greater than usual, but was not so great in the last two weeks as earlier.

The receipts of the Atlantic ports meanwhile have decreased instead of increasing, having been :

Week ending					
Aug. 29.	Sept. 5.	Sept 12.	Sept. 19	Sept. 26.	Oct. 3.
5,455,896	5,444,902	4,533,743	4,743,504	3,842,580	3,691,915

This is an indication that the grain has been used to supply the consumption of interior points to an unusual extent.

A paragraph has been going the rounds of the press to the effect that 800 trains per day, counting those received and dispatched, are now handled at the Grand Central station of New York, and that on Aug. 8, the day of General Grant's funeral, this was increased to 1,200 trains, conveying 125,000 passengers.

If this were true, it would make the Grand Central station by much the busiest station in the world, and would also give it the heaviest single day's record, although one of the London stations is said to have handled 115,000 passengers in one day. Unfortunately, although the original statement has been very widely copied as true, and was worded in so circumstantial and definite a manner as to be well calculated to deceive, it appears to have been merely an evolution from the inner consciousness of some reporter; for it is not only far in advance of the truth, but has no discernible relation thereto.

The total number of *cars* handled at the Grand Central station on Aug. 8, we learn on inquiry, was 1,579, counting those received and dispatched over all three of the roads entering that station. To have handled 125,000 passengers in these cars would have required an average of a fraction over 79 passengers per car; which, without attempting to estimate it precisely, we may be tolerably certain is 15 or 20 per cent. at least in excess of the truth, although many single cars and trains may easily have averaged that number. To make up 1,579 cars into 1,200 trains would give an average of only 1.31 cars per train. What the real number was, we are not informed; but assuming a fifth or a sixth of the stated number of trains, as probability plainly requires, we still have a pretty large traffic, but it is no longer phenomenal. The number of trains run on that day, moreover, was but little increased over the usual traffic, the chief additions having been to the number of cars.

A hot discussion of the merits and demerits of compound locomotives is now going on in *Engineering*, the last number containing five letters on the subject, only two of which are in their favor. The most important of the latter urges chiefly that, of the four chief classes of steam-engines, marine engines are now all but universally compound; portable engines and stationary are more and more built compound, and "why then should not the compound be equally successful when applied to locomotives, when it has the additional advantage of dispensing with coupling-rods?" The surprising information given in the same letter, that experiments on the Eastern Railroad of France show a frictional loss of 35 per cent. of the indicated horse-power "with four-coupled engines" should be taken with a good many grains of salt. A probable explanation for the astounding result is that the record of the dynamometer car behind the tender was taken as the only or chief measure of the effective work, and either the head resistance or the rolling friction of the engine, or both, were not taken into account.

Another letter suggests, in favor of the new type, that it is a great deal easier to write on the cars behind them, the piston pulsations being less noticeable; but those on the other side take the more definite ground that they do not handle trains well, owing to difficulty in starting, are not liked by the men, and do not burn as little fuel as has been claimed, either absolutely or comparatively, when all proper allowances are made. All of which tends simply to show that the expediency of compounding locomotives, and especially of any specific plans for doing so yet in use, cannot yet be regarded as proven, although the steady increase of attention to the subject in several different countries shows that many experienced engineers have found reason to hope much from it.

The very large proportion of locomotives engaged in switching service is shown by the reports to the New York Railroad Commissioner, which gives the numbers employed in each class of service—passenger, freight and switching. These have been for the last two years:

	1884.		1883.	
Locomotives in—	No.	P. c.	No.	P. c
Passenger service	990	26.0	1,010	27.4
Freight "	1,969	51.7	1,870	50.6
Mixed "	151	3.9	85	2.3
Switching "	702	18.4	728	19 7
	3,812	100.0	3,693	100.0
Leased	332		455	

Thus for every 100 locomotives engaged in freight service 88.9 in 1883, and 35.7 last year were employed in switching services, besides which the locomotives in train service do considerable switching.

On many single roads the proportion of switch engines is far greater. The New York Central seems to lead the van with 205 switch engines to 313 freight engines, or 65.6 per cent. Other roads give a descending scale, as follows :

	P. c. of switching to freight engines.
New York Central & Hudson River	65.6
Lake Shore & Michigan Southern	47.4
New York, Lake Erie & Western (apparently)	45.0
Buffalo, New York & Philadelphia	28.2
New York, Pennsylvania & Ohio	23.8
New York, Chicago & St. Louis	20.6
Boston & Albany	18.9
Average of whole state	35.7

There is perhaps some divergency of practice in classifying locomotives; but the contrasts, which are in part easily enough accounted for, are striking.

The form of the report calls for the different kinds of service only for the locomotives owned; at least the footing of the column of numbers in each service reads, "Total number of locomotives owned," while later in the report is a line calling for the whole number of locomotives leased. Of course it is just as important to know the kind of work done by the engines leased as by those owned, and they should be included in the statement of service.

The number of hogs packed in the West during the "summer season" so far, from March 1 to Sept. 30, is reported to have been 3,920,000, which is 545,000, or 16 per cent. more than last year—another effect of last year's good corn crop. The increase has been chiefly at Chicago and Kansas City, Chicago gaining 535,000 (35 per cent.), and Kansas City 168,000 (32 per cent.). There are considerable decreases at Indianapolis and St. Louis, but these are not important summer packing points, and much less Cincinnati. This year Chicago packed 52½ per cent. of the whole and Kansas City 17⅛ per cent., against 45¼ per cent. and 15¾ per cent. last year. The next in rank this year is Milwaukee with 4½ per cent., Indianapolis, St. Louis and Cedar Rapids standing in nearly equal position with 3⅛ per cent. each.

The California wheat-growers are still having their grain carried at very low rates to its very distant market in Europe Quotations Oct. 1 were about 22½ cents a bushel for small iron vessels, 21½ cents for large ones, to Cork for orders, and 15 cents for American wooden vessels direct to Liverpool. From Portland, Oregon, the freights are from 26½ to 29 cents per bushel. The distance is about 13,000 miles.

A rule was recently contributed to *Engineering* by a professor in the Polytechnic School at Prague, for readily determining the speed of a train by counting the revolutions of the drivers, which has a certain convenience, and was as follows :

*Count the revolutions for a number of seconds equal to $\frac{7}{11}$ of the diameter of the drivers in inches. The number of revolutions counted will be the speed in miles per hour.**

For example, if the drivers be 55 in. in diameter; $\frac{7}{11}$ of 55 is 10; and if 24 (or any other) number of revolutions are counted in that number of seconds, the speed is that number of miles per hour.

In order to determine the speed more exactly, two or three times the given number of seconds may be taken, and the number of revolutions as counted divided by two or three. The rule may be remembered from its resemblance in form to a well known rule for determining the tons of rails required per mile, which is :

Tons (2,240 *lbs.*) *of rails required per mile of track = weight of rail in pounds per yard* $\times \frac{7}{11}$.

This last rule, however, is exact; whereas the other is only approximate, the error being about 1¼ per cent. *in excess*; so that a speed which was really only 50 miles per hour, for example, would be given by the rule as 50.88 miles per hour. This correction, however, is easily made, and the error in any case is less than the probable error in counting the revolutions; although we must dismiss as unfounded an assertion of the learned professor who communicates the rule, that it "is diminished by the *unavoidable slip*;" an assertion which again illustrates how prevalent is the notion that there is an "imperceptible slip in locomotives," which we endeavored to dissipate and account for in our issue of Sept. 4 last..

TRADE CATALOGUES.

Price List of United States Standard Postal Car Trimmings. Post & Company, Cincinnati, Ohio.

This volume consists of a number of blue prints of uniform size, 16½ in. x 11 in., bound together. All the detail fittings are illustrated by clear and complete large scale working drawings, with figured dimensions and prices attached. The completeness of the work renders it useful to master car-builders, purchasing agents, and others needing fittings for postal cars. The work was executed by Mr. Otto Bellingrodt, who has had considerable experience in postal car work and was lately engaged by the Government to make drawings of a standard postal car.

Wrought Iron on Railroad Cars. Wilson, Walker & Co., Limited, Pittsburgh, Pa.

This convenient form of book is termed a "pocket companion," and gives engravings of a great variety of the wrought-iron work of which this widely known firm has made a specialty. Every kind of wrought-iron work used in a car is shown here in great variety—draw-bars, arch bars, brake rigging, axles, follower plates, etc.

Attention is very properly called to the great importance of using strong axles under the heavy loads cars now carry. Steel axles have superseded iron axles in England, France and other countries, and in anticipation of a like result here, Messrs. Wilson, Walker & Co. say that they are prepared to make steel car axles to stand the tests of the Pennsylvania Railroad. These tests prescribe that for freight service the axle must stand five blows at 20 ft. of a 1,640 lbs. weight, striking midway between supports 3 ft. apart; axle to be turned over after each blow.

Particulars are given of a steel axle which stood without breaking 16 blows with a fall varying from 20 ft. to 26 ft. The total deflection after each blow varied only from 8⅛ in. to 12¼ in., a very uniform result considering the severity of the test.

Catalogue of the Eames Vacuum Brake Co. Watertown, N. Y.

This elaborate and beautiful catalogue of 62 large folio pages gives full illustrations of every detail of the Eames brake, both as applied to cars and engines, and for both the plain vacuum brake and the new "duplex" or combined plain and automatic vacuum. The latter is a comparatively new improvement, the first patents having been taken out in May, 1881, and operates by a cylinder below each car, in which a vacuum is maintained, remedying, it is claimed, two of the chief objections which have been made to vacuum brakes, that they are slow in application, and that they are not automatic in case of the train breaking in two. The same general plan is in extensive use in England.

More complete information about every mechanical detail of an apparatus of this kind could not well be given.

Some Applications of the Westinghouse Automatic Engine in Railroad Practice. The Westinghouse Machine Co., of Pittsburgh, Pa.

This beautifully printed little pamphlet gives particulars and illustrations of a variety of special applications of the Westinghouse engine to railroad work. Most of the illustrations represent engines actually at work engaged in driving line shafting in a repair shop, running a transfer table, operating a draw-bridge, running a grain elevator, working fans, blowers, and ventilators, performing special duty in a business office, driving stone crushers, running a cold saw for bar iron, curving rails in a rolling mill, driving a winch, running a centrifugal pump, operating a steam fire-engine pump, and numerous other applications, of which the above are fair samples.

An interesting chart of sales is also given, showing the

* The proof of this rule is very simple. If we let d be the diameter in inches, and n the number of revolutions in t seconds we find the revolutions per hour $\frac{n}{t} \times 60 \times 60$ revolutions; from this we have for the distance v traveled in miles per hour : $v = \frac{n \times 60 \times 60}{t} \times \frac{\pi \times d}{5280 \times 12} = \frac{0.1785 d}{t} n$. If we assume $v = n$, we have $t = 0.1785\ d$; the nearest regular fraction to which is $\frac{2}{11}$, or 0.1818, which is 1.86 per cent. in excess

The rule for metric measures is even more simple, viz.: Revolutions for a number of seconds equal to 1½ diameter of drivers in decimetres = speed in kilometres per hour. Error, half of 1 per cent.

number and gross power of the engines sold during each quarter of the years 1882, 1883 and 1884. The increase shown is remarkable, and is progressive except when affected by the panic of May, 1884. In the third quarter of that year, the collective horse-power of the engines sold was less than half that of the engines sold during the second or preceding quarter. A quick recovery followed this depression, for the fourth quarter of 1884 shows a large increase on its predecessor. Further figures given as to the sales indicate that these engines are giving satisfaction to the users.

The Reynolds-Corliss Engine. Westinghouse, Church, Kerr & Co., New York.

This catalogue very completely illustrates and describes the well-known form of engines manufactured by Edward P. Allis, of Milwaukee, Wis. The valve gear and principal working parts of these engines are shown in detail, and the advantages of their peculiar modes of construction are clearly pointed out and explained. The disadvantages of the details used in some other styles of Corliss engines are also explained, and examples are presented of good diagrams given by the Reynolds-Corliss engine, and bad diagrams given by some unfortunate engine of another, but unspecified make. The lessons to be learnt from mistakes and failures are often very instructive; and many will sympathize with the president of an engineering society who during a debate called on a hitherto silent member to speak. The silent member said he hadn't been building any bridges lately, and therefore had nothing to say. "If you cannot point out the merits of your own work, you can call attention to the defects of your neighbors," retorted the president; and a dull debate soon became exceedingly animated and instructive.

Non-Conducting Coverings and Asbestos Products. The Chalmers Spence Co., New York.

This pamphlet gives particulars and illustrations of a variety of applications of asbestos, both in the form of fibre and mill-board. Attention is called to a non-conductor said to possess considerable durability and structural strength composed of a mixture of asbestos fibre and infusorial earth. This mixture is termed "infusorial silicate composition." A removable covering for steam-pipes, etc., is made of asbestos fibre in felted form, placed between confining walls of the same material. This covering is said to be as good a non-conductor as hair and to be far more durable.

TECHNICAL.

Locomotive Notes.

Messrs. H. K. Porter & Co., of Pittsburgh, Pa., lately received on two successive days orders for locomotives for California and Florida, and at the same time were shipping to Panama and Cuba and Venezuela. They are building another little engine for Messrs. Oliver Bros. & Phillips, Clapp-Griffith Works, of Pittsburgh.

The Rogers Locomotive Works are said to have taken a contract for 35 consolidation engines for the Louisville & Nashville. They have just delivered a six-wheel shifting engine to the Naugatuck Railroad.

Car Shops.

The Ensign Manufacturing Co., of Huntington, W. Va., are building 200 cars for the Chesapeake & Ohio & Southern Railroad. They expect soon to be running all departments of their works with the full force of 500 men.

Bridge Notes.

The Passaic Rolling Mill Co. have completed the 432-ft. draw span for the Minnesota & Northwestern Railroad, at St. Paul, Minn. This is the largest draw span in the country, and it has been completed without error or mishap, a fact creditable to the builders, and, naturally, very satisfactory to the railroad company. The weight of the single track span is 600 tons, and it is said to be so nicely balanced that two men can readily turn it. It is designed and intended, however, to be operated by steam power.

The shops at Paterson are fairly busy with varied work, largely for the Delaware, Lackawanna & Western and the New York, Lake Erie & Western railroad companies. Their average output this year has been 1,000 tons per month from the rolling mill, and 500 tons per month from the bridge works.

Iron and Steel.

The Union Pacific Railway Co. will receive tenders up to Oct. 25 for 20,000 tons of steel rails, to be delivered at Omaha, St. Joseph and Kansas City, at the rate of 2,000 tons a month, beginning with January next.

Testing Car Links.

The Helmbacher Forge & Rolling Mills Co. has obtained some very satisfactory results in testing car links of its manufacture. A representative of the *Age of Steel* was shown several links, recently tested, that, after withstanding severe strains, had broken simultaneously at both ends and at diagonal points. Among these were a 1⅝ in. round link that had shown ⅝ in. elongation in 9 in., and had parted at 130,350 pounds, and a 1¼ in. "D," with elongation of 1 in. in 9 in., and a breaking strength of 130,925 pounds.—*St. Louis Age of Steel.*

Fast Time.

A telegram from Indianapolis says that Oct. 8 engine No. 1 on the Indianapolis, Decatur & Springfield road, with Receiver Hammond's private car, ran the distance from Montezuma to Indianapolis, 65.3 miles, in 66 minutes, making one crossing stop, and slowing to 18 miles an hour over a trestle. Part of the distance was run at the rate of nearly 77 miles an hour.

Last week a special on the West Shore road is said to have made 80 miles an hour for several miles.

Improvements at the Novelties Exhibition.

A. Whitney & Sons, of Philadelphia, exhibit some recent improvements in railroad appliances at the Novelties Exhibition at Philadelphia. Among them is a contracting chill, which consists of a sprinkling apparatus in connection with an ordinary flask for casting car wheels. By its use, after "the chill" has been expanded by the heat of the molten metal poured into the mold, it is made to contract again to its original size by the play of continuous jets of water upon its outer surface, thus maintaining contact with the inclosed casting long enough to insure a deeper and more uniform chill than otherwise. The variations in the size of wheels, due to the varying temper of the metal, are also prevented by this process, and a more perfect roundness secured. The efficiency of this apparatus is increased by dividing the interior face of "the chill" into sections as shown in the flask exhibited. A few wheels made by this process have recently been put in use.

Three models are exhibited, showing devices by which, instead of sliding up and down, the windows of cars may be opened from either side, according to the direction in which the train is moving, and when opened be secured at any desirable angle. It is claimed that by this means all dust and cinders will be excluded from the car, to the great relief of the passengers; that the car itself will be thoroughly ventilated by the motion of the train, and the opening of a window by one passenger cannot inconvenience or injure another. One of these models is so constructed that one side cannot be opened without at the same time securely hinging and locking the opposite side, and in such a way that it cannot be unlocked until the opened side is again closed.

Vaccination at the Border.

The sanitary authorities of Buffalo have agreed with the managers of the Grand Trunk and the Michigan Central that all passengers from Canadian points to the United States must present certificates that they have been vaccinated within a year. The passengers will be examined on the lines in Canada before reaching Buffalo or Suspension Bridge, to prevent delay.

The Causes of Boiler Explosions.

An English boiler inspection and insurance company reports that in the 18 years from 1862 to 1879 inclusive, 119 locomotive type boilers exploded in Great Britain. Their annual reports, drawn up by Mr. E. B. Marten, their engineer, classify the causes of these explosions as under:

Bad construction, materials or repairs	32
External or internal corrosion or furrow	45
Overpressure or plates burnt from want of water	27
Collision or broken eccentric rod	5
No particulars obtained	10

It is noticeable that in no case was the cause of explosion a mystery, and that in the majority of cases the boiler was too weak to stand an ordinary working pressure.

The Ames Car Coupler.

The Boston & Albany and the New York Central have definitely adopted the Ames coupler for their freight equipment. On the latter line it is now being applied to 100 cars per month, 500 cars being already fitted.

Decision as to Train Accommodations by the Massachusetts Commission.

Residents of Marlboro, Mass., asked that a through car to Marlboro be attached to the Boston & Albany 4:35 p. m. train out of Boston, and brought the matter before the Railroad Commissioners. Their decision reviews fully the question of the commissioners' jurisdiction in the matter raised by the Boston & Albany road, the position of the Old Colony Railroad Company in the controversy, and the character of the train accommodations now provided for the people of Marlboro, and those asked for. In conclusion, it notes that the board has issued a formal recommendation that the prayer of the petitioners be granted.

THE SCRAP HEAP.

Another Libel on Conductors.

Sympathetic Friend—Can't you do a little something for Conductor Smith, Brown? He has just got to work again after a three months' illness and is very hard up.

Brown—Certainly I will. I am always glad to help a fellow-being in distress. I am going up the road to-morrow on his train, and I'll pay my fare on the cars instead of buying a ticket.

A Self-moving Car.

A Pittsburgh mechanic is said to have devised a plan by which a car in motion supplies its own motive power by its wheels. Compressed air receivers are to start the car, and the motion of its wheels pumps the receivers full again. This is not surprising. It was a Pennsylvania mechanic that invented the Keely motor.—*Vincennes Commercial.*

A Wonderful Machine.

When I was laying the foundation of my mechanical fame and fortune, a few years ago, I boarded in a house filled with locomotive engineers and firemen. A practice prevailed there of enlivening the supper table with social conversation, and the locomotive party being in the majority, the leading theme of talk was stupendous feats performed in railway runs, varied by minor incidents and records of narrow escapes. George Dewhirst, who ran a lathe in the shop, sat opposite me at the table, and he got tired of being excluded from the conversation. He became ambitious to hear himself talk in that crowd. One evening, catching on in a lull in the conversation, he called out loudly to me: "Well, I went over and saw that machine to-day, and it is astonishing the fine work it does." "How does it work?" I inquired. "Well," said he, "by means of a pedal attachment, a fulcrumed lever converts a vertical reciprocating motion into circular movement. The principal part of the machine is a disc which revolves rapidly on a vertical plane. Power is applied through the axis of the disc, and when the speed of the driving arbor is moderate the periphery of the machine is traveling at great velocity. Work is done on this periphery. Pieces of the hardest steel are by mere impact reduced to any shape the skillful operator desires." "What in thunder is the machine, any way?" demanded Tom Jones. "Oh, it is a new grindstone," replied George, and a silence that could be felt passed round the supper table.—*Mechanical Progress.*

Evolution of Logging Railroads into Common Carriers.

The lumbermen of Michigan and Wisconsin are evincing their ability to build railroads of considerable length, and run them not only in the interest of their log and lumber operations, but also for the convenience of the public. Isolated sections in Northern Michigan and Wisconsin, which would otherwise remain for many years without railroad facilities, are suddenly let out of the woods by an enterprising lumber firm, that puts through a railroad in less time than it would require an ordinary railway corporation to make surveys and obtain right of way. The Cummer road, in Wexford County; the Wright & Ketcham road, from Averill to Ketcham, in Midland County, recently completed; the Detroit, Bay City & Alpena line, commonly called Alger's road, now being pushed forward from Au Sable to Black River; the R. G. Peters road, nearly completed from Eastlake, near Manistee, to a point 20 miles inland; the N. C. Foster railroad, out of Fairchild, Wis., and several other long lines are instances of remarkable private enterprise in building and managing railroads. Most of the lines mentioned, if not all, carry passengers and freight for the inhabitants of the districts through which they run. They will tend to develop such districts in advance of other lumber regions that have no railroads. They were primarily constructed to carry the tributary pine to mills or dumping grounds; but it is very likely that when the pine is all gone, it will be found that a local traffic has grown up that will keep the roads perpetually running. Those that are narrow gauge will be converted into standard gauge, and at last it will be found that the settler who located his farm, his store, or his manufactory near the line of one of these logging roads, made a better strike than the settler who planted himself at a distance, thinking that a logging railroad was of little account.—*Northwestern Lumberman.*

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be as follows:

The *Brotherhood of Locomotive Engineers*, will hold its annual convention in New Orleans, beginning on Wednesday, Oct. 21.

The *American Street Railway Association* will hold its annual convention at the Southern Hotel in St. Louis on Wednesday, Oct. 21.

The *Central Club of Car Accountants* will hold its next meeting in Columbus, O., on Wednesday, Nov. 18.

The *Eastern Division of the Car Accountants' Association* will hold a quarterly meeting in Philadelphia, on Thursday Nov. 19.

Foreclosure Sales.

The *Cleveland, Delphos & St. Louis* road, of 3 ft. gauge, built in 1882, from Delphos, O., eastward 46 miles to Mt. Blanchard, and afterwards 10 miles further to Carey, was sold under foreclosure of the mortgage Oct. 7 at Toledo for $116,500 to C. W. Jones, of Youngstown, O., the representative of Messrs. Keller and Temple, the principal creditors. The road was sold once before this year, Feb. 19 last, to Wm. Temple, Joseph Boemer and James Callery, a committee of the bondholders.

The Time-Table Convention.

The semi-annual Time-Table Convention was held in Chicago Oct. 8, at the Grand Pacific. The attendance was not as large as usual, and the proceedings were short. No changes in existing time schedules were made. The committee appointed at the last meeting to report a system of uniform train rules, etc., for all the roads in the country, announced that it was not yet prepared to make a report, and asked for further time, which was granted. A proposition was adopted that the subjects to be considered by the Time-Table Convention should embrace all matters concerning the operation of railroads, instead of fixing time-tables merely. The Secretary, Mr. Allen, was requested to address a letter to the general managers of all the roads in the United States and the Canadas, asking them to join this body in order to have but one time-table association, instead of two or three, as at present, as thereby the work of arranging time-tables and securing a uniform system of running roads would be greatly facilitated. A delegation of train-dispatchers was before the meeting asking that its association be recognized by the Time-Table Convention, and that its suggestions be adopted. This matter was referred to the Committee on Uniform Train Rules. The convention then adjourned until the second Tuesday in April at the Grand Hotel, Cincinnati.

ELECTIONS AND APPOINTMENTS.

Bayfield Harbor & Great Western.—The first board of directors of this new Wisconsin company consists of Oliver Dalrymple, St. Paul; D. F. Glover, Bayfield; W. F. Dalrymple, Geo. H. Noyes and D. C. Meillett, Milwaukee.

Chicago, Burlington & Quincy.—W. H. Mileham, late foreman of the company's lumber yard at Aurora, has been appointed Inspector of Lumber and Timber for the whole road, with office in Chicago.

Chicago, Milwaukee & St. Paul.—J. M. Taylor, previously Canada Agent, has been transferred to the Pittsburgh district, taking the place of W. J. Neison, resigned.

Chicago & West Michigan.—Mr. George C. Watrous is appointed Superintendent of Motive Power and Rolling Stock of this railroad, with office at Muskegon, Mich., taking effect Oct. 1. The position of Master Mechanic is abolished. He takes the same office at the same time on the Detroit, Lansing & Northern.

Cleveland, Columbus, Cincinnati & Indianapolis.—Mr. G. M. Beach, recently appointed Assistant General Manager, has been made General Manager, to succeed Mr. E. B. Thomas, who has gone to the Richmond & Danville.

Detroit, Lansing & Northern.—Mr. George C. Watrous is appointed Superintendent of Motive Power and Rolling Stock of this and the Saginaw Valley and St. Louis Railroads, the appointment taking effect on Oct. 1. The office of Master Mechanic and Master Car-Builder is abolished.

Indiana, Illinois & Iowa.—D. L. Murphy, formerly Assistant Train Master of the Chicago & Alton, has been appointed Superintendent of Transportation and Superintendent of Telegraph, in place of D. G. Henshaw. He will have charge of car, train, station and telegraph service.

International Bridge Co.—Hon. Elbridge G. Spaulding and Hon. E. Carleton Sprague, Buffalo; Joseph Hickson, L. J. Seargeant and Hon. James Ferrier, Montreal; John Bell, Belleville, Ont., and Henry Yates, Brantford, Ont., were re-elected directors at the annual meeting in Buffalo, Oct. 7. They chose E. G. Spaulding, President; Joseph Hickson, Vice-President; R. Wright, of Montreal, Secretary and Treasurer; E. P. Hannaford, Montreal, Chief Engineer.

Memphis & Little Rock.—Mr. A. J. Whitney has been appointed Master of Trains, with office at Memphis, having charge of train movement, telegraph service and distribution and transfer of cars, taking charge Oct. 8.

Officers who previously reported to H. G. Fleming, Superintendent of Transportation and Road Department, will till further orders report directly to Rudolph Fink, General Manager and Agent of Trustees.

Milwaukee, Lake Shore & Western.—Mr. J. S. Jones has been appointed Assistant Superintendent, having charge of the line between Watersmeet and Ashland.

Missouri Pacific.—H. G. Fleming, late Superintendent of the Memphis & Little Rock, has been appointed Superintendent of the St. Louis, Iron Mountain & Southern Division, succeeding William Kerrigan, promoted to be General Superintendent of the whole Missouri Pacific system.

New York Central & Hudson River.—Mr. Theodore Voorhees, who has been Superintendent of the Saratoga and Champlain divisions of the Delaware & Hudson Canal Co., has been appointed to the new office of Assistant General Superintendent.

Ohio & Mississippi.—At the annual meeting in Cincinnati, Oct. 8, A. Gracie King, Geo. C. Magoun, Charles R. Flint and James Renwick, all of New York, were elected directors for five years, by the unanimous vote of the 146,585 shares voting, taking the place of James Sloan, Jr., and J. L. Donaldson, of Baltimore; Harry Pearson, of London, England, and F. Jannsen, of Louisville. The four retiring directors were counted representatives of the Baltimore & Ohio interest; the four new ones of the English interest. W. W. Pea-

body, of Cincinnati, was re-elected President, and W. M. Walton, of New York, Secretary.

Richmond & Danville.—A. S. Dunham was appointed Comptroller Oct. 9, with general supervision and control of all matters of account.

St. Paul & Duluth.—Mr. J. F. Dodge, well known as an engineer of extended experience in the Northwest, takes charge of this company's improvements at Duluth and West Superior.

Suburban Rapid Transit Co.—At the annual meeting at No. 74 Wall street, New York, Oct. 12, S. R. Filley, D. B. Safford, Gustav Schwab, J. Hood Wright, Geo. S. Bowdoin, C. F. Christensen, C. H. Coster, J. J. Crane and E. D. Adams were elected directors; S. R. Filley, President; C. K. Filley, Secretary and Treasurer.

Union Pacific.—Official announcement is made of the appointment of A. T. Palmer as Assistant Superintendent of the Kansas Division, in place of W. J. Converse, resigned, in charge of the third, fourth, fifth and sixth divisions, taking effect Oct. 15.

Virginia Midland.—J. W. Wentworth has been appointed Secretary, with office in Washington, D. C. Official announcement was made Oct. 12 of the appointment of E. B. Thomas as General Manager.

West Superior Terminal & Transfer Co.—At the first annual meeting in Hudson, Wis., Oct. 5, J. T. Odell, W. H. Fisher, Allen Manvel, E. W. Winter, Geo. S. Baxter and J. H. Hammond were elected directors; J. T. Odell, President; W. H. Fisher, Vice-President; Geo. S. Baxter, Secretary and Treasurer.

PERSONAL.

—It is reported that Mr. O. B. Skinner will soon retire from his position as Traffic Manager of the Cleveland, Columbus, Cincinnati & Indianapolis Railway.

—Capt. C. M. Gray, Assistant General Freight Agent of the Lake Shore & Michigan Southern, now in his 80th year, is in a very feeble condition and confined to his home.

—Mr. E. T. Jeffery, General Superintendent of the Illinois Central Railroad, has returned from a three months' visit to Europe, where he was a delegate to the Brussells Railroad Congress.

—Mr. E. P. Ripley has declined the position of Traffic Manager of the Missouri Pacific recently offered him, and will remain with the Chicago, Burlington & Quincy, as General Freight Agent.

—John Watson, who was conductor of the first train on the Great Western Railway of Canada, and was still a conductor on that line, was drowned while hunting near Amherstburg, Ont., recently.

—Mr. G. M. Beach, the new General Manager of the Cleveland, Columbus, Cincinnati & Indianapolis Railway, was once a trackman on the road, rising to be Section-Master, Superintendent of Maintenance of Way, Division Superintendent, and Road-Master, from which latter position he was promoted to be Assistant General Manager.

—Mr. Theodore Voorhees, who last week was appointed to the important position of Assistant General Superintendent of the New York Central & Hudson River Railroad, entered railroad service July 15, 1869, in the engineering department of the Delaware, Lackawanna & Western; in December, 1872, was made Superintendent of that company's branch Syracuse, Binghamton & New York road: returned to the engineering department 20 months later for a short time, and in March, 1875, became Superintendent of the Saratoga and Pennsylvania divisions of the Delaware & Hudson Canal Co., which he held till his new appointment.

TRAFFIC AND EARNINGS.

Central Iowa Traffic Association.

The September earnings from the pooled business, which is that of Des Moines and several other Iowa points, were $46,207 from west-bound and $4,500 from east-bound freight, 8,251 tons going west and 959 east. The shares allotted are 40 per cent. to the Rock Island and 15 per cent. each to the Northwestern, the Burlington, the St. Paul and the Wabash. The Rock Island carried 44 per cent. in September, the Northwestern and the Wabash 16 each, and the Burlington and the St. Paul 12 each. Of the small east-bound traffic, which is allotted in the same proportions, the Rock Island had 29, the Northwestern 39, the Burlington 15, the St. Paul 9 and the Wabash 8 per cent.

Prices of Rails.

Business is reported duller, but prices remain quoted $30 to $31 at Eastern mills, and some Western mills offer at $32 for early delivery. Railroads are said to delay placing orders for next year's work, but there are many inquiries.

San Francisco Passenger Association.

This association (of the Pacific coast agents of Eastern roads) has agreed to maintain the regular rates to the East, made by the Southern Pacific Co. Street commissions are allowed at the rate of $1 for tickets to Mississippi River points, $3 to seaboard points and $2 to points between the Mississippi and the seaboard. A penalty is fixed for violations of the agreement.

This business has been very badly demoralized much of the time.

Manitoba Traffic.

A statement of the agreement between the Canadian Pacific and the St. Paul & Manitoba concerning Manitoba traffic is that the latter is to make the same rates from St. Paul to Winnipeg as are made by the Canadian Pacific from Port Arthur to Winnipeg, which will make it necessary for the lines east of St. Paul to make rates to St. Paul on Manitoba traffic nearly as low as rates to Port Arthur by rail and lake.

August Earnings of South Carolina Railroads.

The South Carolina Railroad Commission makes the following statement of the gross earnings of the 17 railroads in that state in the month of August:

	1885.	1884.	Increase.	P.c.
17 railroads	$400,902	$361,117	$39,785	11.0

Twelve of the roads have an increase, and the aggregate decrease of the other five is only $1,491.

New England Traffic.

The Clearing House at Boston reports the numbers of loaded cars coming into New England at all points during September to have been:

	1885	1884.	Increase.	P. c.
No. cars	41,379	35,927	5,452	15.0

This is a large gain, especially when it is considered that there was a very large decrease in the grain movement.

Chicago Traffic Notes.

The lumber rate from Chicago to Council Bluffs was reduced from 18 to 15 cents by the Rock Island road last Saturday, it charging that other roads had been making the 15 cent rate secretly and now rates from all places to all points have been reduced by the same amount.

The Northwestern Traffic Association, the Pacific Coast Association and the Western Freight Association, at a meeting in Chicago Oct. 7, resolved that after Oct. 8 they would not haul sheep in double-deck cars, but would accept recognized divisions of established through rates on single-deck cars, provided the rate from Missouri River points, St. Paul, Minneapolis or Minnesota Transfer to Chicago is not less than $30.

During September the Western Weighing Association weighed in Chicago:

	1885.	1884.	Increase.	P. c.
No. cars	67,121	61,478	5,643	9.2

In August last the number weighed was 58,261.

The Chicago, Milwaukee & St. Paul announces that it will not receive for transportation high explosives of which nitro-glycerine forms the basis.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1885.	1884.	Inc. or Dec.	P.c.
Nine months to Sept. 30:				
Boston, Hoosac Tun. & W.	$339,087	$334,317	I. $4,770	1 4
Bur., C. R. & No.	2,164,096	1,952,463	I. 211,633	10.3
Char., Col. & A.	561,415	511,120	I. 50,295	9 8
Cleve., Ak. & C.	763,815	362,776	I. 1,039	0.3
Col. & Greenville.	454,197	418,743	I. 35,454	8.5
Ev. & T. Haute.	553,587	564,375	D. 10,788	1.9
Flint & Pere M.	1,405,559	1,734,821	D. 329,262	19.0
Fla. Ry. & N. Co.	690,564	704,155	D. 13,591	1.9
Grand Trunk	10,986,650	12,479,003	D. 1,492,353	11 9
Gulf, Col. & S. F.	1,082,323	1,213,830	D. 131,507	10.8
Illinois Central:				
Ill. lines	4,690,826	4,493,872	I. 196,954	4.4
Southern Div.	2,902,895	2,747,449	I. 155,446	5.7
Iowa lines	1,157,759	1,224,813	D. 67,054	5.5
Kansas City, Ft. Scott & Gulf	1,839,448	1,751,488	I. 87,960	5.0
Kan. City, Spr. & Memphis	1,126,184	829,986	I. 296,198	35.7
Mobile & Ohio.	1,316,597	1,409,984	D. 93,387	6 6
N. Y., Ont. & W.	1,401,609	1,466,952	D. 65,343	4.4
Norfolk & West.	1,944,526	1,926,803	I. 17,723	9.2
Rich. & Dan.	2,822,311	2,699,873	I. 122,438	4.5
St. L., A. & T. H.:				
Main Line	878,940	986,943	D. 108,003	10.9
St. P. & Duluth.	915,181	891,503	I. 23,678	2 6
Va. Midland	1,134,785	1,184,174	D. 49,389	4.2
Wabash	10,199,124	11,167,885	D. 968,761	8.7
Western N. C.	337,544	318,328	I. 19,216	6.0
Wisconsin Cent.	1,030,862	1,011,182	I. 19,680	2.0
Month of July:				
C., I., St. L. & C.	$177,087	$209,515	D. $32,428	15.4
Net earnings	66,673	71,959	D. 5,286	7.3
Month of August:				
C., I., St. L. & C.	$206,850	$244,117	D. $37,267	15.3
Net earnings	89,841	98,199	D. 8,358	8.2
Oreg. Short Line.	186,128	99,428	I. 86,700	87.2
Net earnings	79,967	41,791	I. 38,176	91.3
Month of September:				
Boston, Hoosac Tun. & W.	$44,844	$46,737	D. $1,853	4.0
Bur., C. R. & No.	299,973	261,160	I. 38,813	14.8
Char., Col. & A.	80,150	64,276	I. 15,874	24.7
Col. & Greenville	63,400	51,130	I. 12,270	24.0
Cleve., Ak. & Col.	47,927	46,587	I. 1,340	3.0
Ev. & T. Haute.	70,601	69,302	I. 1,299	1.9
Flint & Pere M.	167,626	172,199	D. 4,573	2 7
Fla. Ry. & N. Co.	64,978	60,737	I. 4,241	7.0
Grand Trunk	1,298,603	1,480,934	D. 182,331	13.0
Gulf, Col. & S. F.	211,048	185,271	I. 25,777	13.4
Illinois Central:				
Ill. lines	606,144	591,282	I. 14,862	2.5
Southern Div.	306,544	324,783	D. 18,239	5.7
Iowa lines	157,391	166,626	D. 9,235	5.5
Kansas City, Ft. Scott & Gulf	210,144	191,751	I. 18,393	9.6
Kan. City, Spr. & Mem	103,021	90,756	I. 12,265	13 6
Man. Elevated	562,700	533,060	I. 29,640	5.6
Mobile & Ohio	156,323	160,669	D. 4 346	2.7
N. Y., Ont. & W.	187,275	205,318	D. 18,343	8.9
Norfolk & West.	246,825	266,069	D. 19,244	7.2
Rich. & Dan	371,500	330,700	I. 40,800	12.4
St. Jo. & Grand Island	112,293	111,941	I. 352	0.3
St. L., A. & T. H.:				
Main Line	113,713	113,230	I. 483	4.3
St. P. & Duluth.	172,572	152,143	I. 20,429	13.4
Va. Midland	167,304	170,268	D. 2,964	1.7
Wab., St. L. & P.	1,236,160	1,427,875	D. 191,715	13.4
Western N. C.	45,864	42,879	I. 2,985	7.0
Wisconsin Cent.	117,323	112,686	I. 4,637	4.1
First week in October:				
Bur., C. R. & No.	75,837	58,848	I. 16,989	28.9
Canadian Pac.	180,000	165,000	I. 15,000	9.0
Chicago & Alton.	179,176	223,928	D. 44,758	20.0
Chi. & East. Ill.	40,282	41,016	D. 734	1.8
Chi., Mil. & St. P.	590,000	554,676	I. 35,324	6.4
Chi. & Nor'west.	604,900	533,400	I. 71,500	13.4
Ch St. P., M. & O.	138,930	131,900	I. 7,000	5.3
Chi. & W. Mich.	24,509	24,964	D. 455	1.8
C., I., St. L. & C.	49,422	53,699	D. 4.277	8.0
Det., Lan. & No.	24,795	26,126	D. 1.331	5.1
Ill. Cent. & So. D.	225,000	229,221	D. 4,221	1.9
Iowa lines	42,000	33,900	I. 8,100	24.0
Long Island	61,334	60,629	I. 705	1.2
Louisv. & Nash.	272,220	278,140	D. 5,920	2.1
Mexican Cent.	44,000	56,679	D. 12,679	22.3
Northern Pac.	340,765	304,800	I. 35,965	11.8
Oreg. R. & N. Co.	133,899	102,981	I. 30,917	30.0
Roch. & Pitts.	24,196	25,853	D. 1,657	6.4
St. L. & San F.	104,600	105,300	D. 700	0 7
St. P. & Duluth.	44,089	33,151	I. 10,936	33.0

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

Trunk Line Passenger Pool.

Negotiations continue. An agreement has been reached for a division of the gross earnings, from New York and Boston to Buffalo and Suspension Bridge. It has been decided to admit differential rates. An emigrant pool has been discussed.

Western Freight Association.

This Association reports the earnings of the Omaha, Council Bluffs and Papillion range cattle pools in September to have been $159,607, of which 26.1 per cent. was for traffic over the Chicago, Burlington & Quincy, 18.4 over the Rock Island, 17.3 over the Milwaukee & St. Paul, 17.2 over the Northwestern, 11.4 over the Missouri Pacific, 8.7 over the Wabash, 0.9 over the St. Paul & Omaha, and only $22 over the Kansas City & Council Bluffs. The Burlington carried 22½ per cent. more than its share, the Rock Island 7 per cent. more, the St. Paul and the Northwestern a trifle more: while the Wabash carried 45 per cent. less than its share, the St. Paul & Omaha 82 per cent. less, and the Kansas City & Council Bluffs earned only $22 against the $7,980 its share would have brought it.

The through freight earnings (Council Bluffs-Chicago) of the five roads in this Association amounted to $177,160, of which the Burlington earned 45.8 per cent., the Northwestern 20.3 per cent., the Rock Island 19.7, the Milwaukee & St. Paul 9.2, and the Wabash 5 per cent. The Northwestern carried 79 per cent. more than its share, and the Burlington 9 per cent. more; the others were short.

Fluctuating Lumber Rates.

The Lumber Manufacturers' Association has addressed to the Northwestern railroads engaged in carrying lumber the following resolution:

"*Resolved*, That it is the sense of this Association that the constantly fluctuating character of railroad tariffs is a serious cause of demoralization in the lumber trade, creating uncertainties among dealers, and undue and disastrous competitions, practically placing at short intervals what operates as an embargo upon business; and this convention hereby memorializes the managers of the railroads of the Northwest, asking in the name of this Association and of the lumber trade generally, that changes in railroad tariffs be not made oftener than at intervals of three months, believing that the interests of the railroad companies in this matter are coincident with those of the manufacturers, dealers and consumers of lumber."

Traffic Notes.

The pool at Mattoon, Ill., has been reëstablished.

The Hannibal & St. Joseph was fined $100, by the decision of E. P. Wilson, Commissioner of the Chicago, St. Louis & Missouri River Passenger Association, on the complaint of the Rock Island road, for having, in violation of its agreement, sold a ticket to Harrisburg, Pa., for $24, the tariff rate for which was $24.75, the selling agent apparently acting without the countenance of his superior officers, and trying to evade the consequences by altering the ticket after he had redeemed it.

Southwestern Association Earnings.

The report for September shows the earnings of the five roads in the pool to have been $819,588 for merchandise, the Chicago, Burlington & Quincy making 29.7 per cent. of the whole, the Wabash 20.6, the Chicago & Alton 19.1, the Missouri Pacific 18.2, and the Rock Island 12.4 per cent. The earnings in the lumber pool were $177,141, 24.1 by the Burlington, 20.5 by the Rock Island, 18.1 by the Chicago & Alton, 16.7 by the Wabash, 7.7 by the Missouri Pacific, 7.7 by the Hannibal & St. Joseph, and 5.2 by the Kansas City & Council Bluffs.

Cotton Rates.

The Trunk Line Executive Committee gives notice that rates on cotton to New York city went into effect Oct. 7 as follows: Uncompressed, from Memphis, 57 cents per 100 lbs.; St. Louis and Hannibal, Mo., 49; East St. Louis, East Hannibal and Evansville, 45; Cairo, 47; Louisville, Jeffersonville and New Albany, 43; Cincinnati, 40. Rail and river rates will be the same, the lines being allowed to pay insurance for the benefit of the shippers, but not to them. On compressed cotton the rates are: East St. Louis, Cairo and Evansville, 32 cents; Louisville, Jeffersonville and New Albany, 29; Cincinnati, 27; but on compressed cotton reaching the above points by steamers not working under agreed rates, the rates will be 2 cents higher than the above, and from Cincinnati 4 cents higher.

Cotton brought to Cairo from the South by the Mobile & Ohio and the Illinois Central will pay the local rate of those roads to Cairo plus 15 cents less than the Cairo rate, plus the cost of compressing at Cairo or further south.

It was announced that the trunk lines will not accept less than their proportion of the above rates on any cotton reaching them after Oct. 15, and that no commissions shall be paid for securing business.

Excursion Rates to the City of Mexico.

The Mexican Central, the Atchison, Topeka & Santa Fe, the Missouri Pacific, and the Galveston, Harrisburg & San Antonio roads have issued a joint circular announcing excursion rates to the city of Mexico from Leavenworth, Atchison or Kansas City as follows: In parties of ten, $165; fifteen, $160; twenty, $155; twenty-five, $150; thirty, $140; thirty-five, $130; forty, $120; forty-five, $110; fifty or more, $100. From St. Louis, Cairo, Hannibal, Memphis or New Orleans the rates will be $10 more than the above. These tickets will be good for six months.

Saginaw Valley Lumber Shipments.

The lumber shipments from the Saginaw Valley for the nine months ending with September were less this year than in any other since 1879, having been for seven years in *millions* of feet:

1879.	1880.	1881.	1882.	1883.	1884.	1885.
488.0	624.0	597.2	656.6	597.2	620.4	506.8

The decrease from last year is more than one-sixth.

For the month of September the shipments were:

	1883.	1884.	1885.
From East Saginaw	29.6	29.7	31.8
" Bay City	72.9	75.8	59.8
Total	102.5	105.5	91.6

The decrease in September this year is 13 per cent., which is less than the decrease for the year.

RAILROAD LAW.

Powers of a State Railroad Commission.

The Supreme Court of the United States Oct. 13 began hearing arguments upon the "Mississippi Railroad Commissioners cases." These are three in number, having points of difference, but similar in their main features, and they are being argued together. They involve a decision upon the right of a state to fix tariff rates, prescribe localities for depots and make other regulations for railroads which are built and operated under charters of other states or of the United States. In 1884 the Mississippi Legislature passed a Railroad Commission bill providing for the appointment of a board of commissioners authorized and required to fix tariff rates for railroads lying in and passing through the state, and to exercise certain other functions in the management of the lines, and empowered the commission to demand, under penalties for non-compliance, such information from the roads as might be found desirable in the performance of duties. The commission took steps to carry out the law, giving the roads notice of the fact, whereupon the Farmers' Loan & Trust Company, as Trustees of the Mobile & Ohio road; the Illinois Central, and the New Orleans & Northeastern each attacked the law in the Federal courts, holding it to be unconstitutional, and secured an injunction restraining the Commissioners from carrying the state law into effect. The question comes before the Supreme Court upon appeal from the decision of the court below.

OLD AND NEW ROADS.

Alabama, New Orleans, Texas & Pacific Junction.—The English holders of the first debentures have resolved that $2,695,000 prior lien bonds shall be issued by the New Orleans & Northeastern and Vicksburg, Shreveport & Pacific companies, to provide for floating debt and construction, and to pay off $750,000 of the coupons maturing up to July 1 The trustees have been authorized to sell bonds of the Vicksburg & Meridian for immediate requirements.

Atchison, Topeka & Santa Fe.—In an interview at St. Louis, President Strong is reported as saying that the company's lines in Southern California are progressing rapidly, and by Nov. 1 the Atchison will have its own line into San Diego. At present there is no intention of building northwest from San Diego, nor west from Mojave, the junction point of the Atchison & Topeka and Atlantic & Pacific's joint line from Albuquerque and the Southern Pacific, nor will there be so long as the present amicable relations between the three companies continue. Should there be any trouble between them, and it should become necessary for the Atchison to compete with the Southern Pacific for the North Pacific coast business, it could easily establish a line of steamers to run from San Diego to all coast points on the Pacific slope, but there are no indications that his company will be compelled to establish such a line. The Atchison now reaches the Pacific coast by using the Atlantic & Pacific, in which line it has a half interest, from Albuquerque to Mojave, a distance of 815 miles, and running from there over the Southern Pacific. The line now building by the Atchison leaves the Atlantic & Pacific at Waterman, a point 70 miles east of Mojave, and runs south from there to Colton on the Southern Pacific. At Colton connection is made with the California Southern. This road was recently purchased by the Atchison. It runs due south from Colton, 127 miles to San Diego, its southern terminus. The distance between Waterman and Colton is 80 miles. All but 15 of this has been graded. This gap will be completed and the line in running order by Nov. 1. This will give the Atchison a through Pacific coast line, and it will then be in a position to compete for Southern California business without dependence upon the Southern Pacific or any other road.

Bayfield Harbor & Great Western.—This company was organized in Wisconsin, Oct. 7, to build a railroad from Bayfield, Wis., westward to the Minnesota line, near Duluth, and another from near the western end of the above line southward to a point opposite Stillwater, Minn., in all about 200 miles; the capital authorized is $5,000,000.

Boston & Albany.—Working time in the repair shop at Springfield, Mass., was reduced to nine hours, Oct. 7.

A locomotive with the Coventry boiler has been received for trial at the Springfield round-house, coming from the New York Division of the Pennsylvania.

Boston & Lowell.—The working time in the shops at Concord has been reduced from ten to nine hours a day, with a corresponding reduction in wages.

Buffalo, New York & Philadelphia.—Mr. J. H Passmore is rebuilding this company's telegraph line between Buffalo and Olean.

Canadian Pacific.—It is announced that the Lake Superior section will be opened for freight traffic Oct. 18, and for passenger business Nov. 21, when the whole line from Montreal to Kicking Horse Pass, 2,394 miles, will be in operation.

It is reported that this company has authority under its charter to construct telegraph lines throughout the Dominion, and that it will immediately begin the construction of a general telegraph system to compete with the Northwestern Company in Canada.

Central Massachusetts.—There is talk of extending the road from Jefferson to Barre Plains.

Central Vermont.—A spur 110 rods long has been completed to the marble quarry of the Mutual Marble Co. in Brandon, Vt.

Chicago & Alton.—A new cut-off on the Kansas City line is in progress, and 10 miles of it, from Clark to Higbee, were opened Oct. 11.

Chicago, Burlington & Northern.—A large force is reported to be engaged on the line between East Dubuque and Savannah and in building the bridge across the river at Galena, and it is said that tracklaying will be begun before November.

Large purchases of land have been made at La Crosse, either for this company or the Northwestern, including nearly a square mile, much of which is a marsh.

Tracklaying was to begin this week below St. Paul, and it is said that the track will be laid from St. Paul to the St. Croix River by Jan. 1, so that the bridge work between St. Croix and the Chippewa rivers may be completed by early spring. McArthur Bros. have the contract for this part of the work.

Chicago, Burlington & Quincy.—The grain and flour delivered at Chicago by this road in the four months ending with September were:

	1885.	1884.	Decrease.	P.c.
Flour, bbls	19,844	81,508	51,664	72.2
Grain, bu	14,037,361	21,904,848	7,867,487	35.9
Total, bu	14,126,659	22,226,634	8,099,975	36.4

This goes far to account for the large decrease of earnings in August.

Chicago, Milwaukee & St. Paul.—There was a meeting of the train dispatchers of the various divisions of this road, 28 in all, in Milwaukee, Sunday, Oct. 6, together with the Assistant General Superintendent and some division superintendents, at which the system of train orders adopted by the Train Dispatchers' Association at Denver last June, with some amendments, was recommended to the company's officers for adoption, and there was some general discussion of train running. Another meeting is to be held on the second Sunday of June next year.

Cincinnati, Hamilton & Dayton.—This company has a difference with the Union Railway Co., which owns the union depot at Indianapolis and the entrance into the city. It claims the use of the tracks and station for $6,000 a year, while the Union Co. claims $21,000. The Cincinnati company claims that it was offered the terms it offers to pay in consideration of its giving up property and franchises for a station of its own.

Clinton & Warsaw.—This company has secured 90 convicts to work during the winter at Angola Bay on its road, which is to extend from the Wilmington & Weldon road at Warsaw, N. C., 54 miles north of Wilmington, northwestward 12 miles to Clinton, the county seat of Sampson County. It is hoped to have it completed in three months.

Distances from Chicago to St. Paul.—A statement of these distances copied by us recently, in announcing the opening of the new Minnesota & Northwestern road, was incorrect. The distance of the Chicago, Milwaukee & St. Paul is not 422 miles, but 410; by the Northwestern it is the same, and not 421; by the Wisconsin Central, as trains now run, it is 457 instead of 438. These are to be compared with the 482 miles by the Minnesota & Northwestern and the 531 by the Minneapolis & St. Louis.

Fort Worth & New Orleans.—It is reported that the grading will be completed to Mansfield Nov. 5, that the track will then be laid, and that afterward the road will be extended to Waxahachie or Corsicana, Tex.

Fremont, Elkhorn & Missouri Valley.—It is reported that the Black Hills line will be continued northward, skirting the Black Hills on the east to the Hay Creek coal fields, within about fifty miles of the Northern Pacific, with a branch through Deadwood to Lead City.

Lincoln, Neb., votes Nov. 7 on the question of giving this company $50,000 of its 5 per cent. bonds, in aid of a branch to that place, to be completed by Nov. 1 next year.

Houston, East & West Texas.—The rails to complete the Louisiana end of the line have been received, and were to be laid on the eight miles from the present terminus to the Sabine River at Logansport by the end of this week. Tracklaying was progressing on the Texas end north of Timpson, and it was hoped to complete it to the Sabine at the same time, when the bridge over the Sabine would be built and complete the line from Houston to Shreveport.

Illinois Central.—It is again reported that this company and the Michigan Central (which enters Chicago over the Illinois Central tracks) have agreed upon plans for a union station on the lake shore in Chicago, to take the place of the ruin left by the Chicago fire, which they still occupy. It is to be somewhat larger than the old one, of brick and stone, to cost $175,000 to $200,000, and will be begun next spring and finished in the fall.

Indianapolis, Decatur & Springfield.—The Supreme Court of Indiana has decided that $65,000 voted by an Indiana town in 1870 to the Indiana & Illinois Central belongs to this company, which has succeeded it.

Kansas City & Southwestern.—The track was laid to the station in Winfield, Kan., Oct. 9.

Lansing, Alma & Northern.—The first train ran over the extension to Shepard City, Mich., Oct. 8.

Louisville Southern.—It is charged that a conspiracy has been made by the promoters of this company and the Mayor and certain members of the Council of Louisville to give the company a subsidy of $1,000,000 by indorsing the railroad's bonds without submitting the question to a popular vote. A temporary injunction against such indorsement was granted Wednesday.

Macon & Covington.—This company asks the people of Macon, Ga., to take $100,000 of the stock of this road, to be paid for only when the first train enters Macon. At a meeting in Macon, Oct. 7, Col. L. F. Livingston in behalf of the company said that the road would be 105 miles long, from Macon to the Atlanta & Charlotte Air Line at Green's Crossing, near Gainesville, Ga.; that it would not cost more than $12,000 per mile; that capitalists in New York and Boston have agreed to furnish the money necessary at 6 per cent., as soon as the necessary amount of stock is taken; that all counties on the line have subscribed liberally, and that if Macon subscribes $100,000 the shops and offices of the road would be established there, and the supplies required while building bought there. A telegram was received from Gen. J. B. Gordon, in New York, asking that nothing be done at Macon to interfere with the building of the road, as there was danger of driving off the large capitalists behind the enterprise. Colonel Frobell, of Atlanta, is Chief Engineer.

Missouri Pacific.—The company has just bought 20 acres of land near the city limits of Omaha for shops and yards. It is reported that a branch of the Omaha line will be built to Lincoln, Neb., which has voted $50,000 in aid of it.

New Orleans & Northeastern.—The company has again two through passenger trains daily between New Orleans and Cincinnati, one making the run in 29¼ hours.

New York Central & Hudson River.—The following circular has been issued to the stockholders:

"The directors of this company have deemed it advisable to agree, in the event of the West Shore railway being purchased by the committee of creditors of the road having the matter in charge, to become lessees of the road for a long term of years, guaranteeing the payment of the principal and interest upon $50,000,000 of first-mortgage bonds, by way of rental, at 4 per cent. interest per annum, the West Shore Company transferring to this company the whole of its capital stock, amounting to $10,000,000 at par. The location of that road, connecting at every important point with the New York Central, made a legitimate competition under separate management impossible and a wasteful rivalry inevitable, tending everywhere to promote special rates and special privileges destructive to both roads and doing the public no good. The result was seen in the almost immediate bankruptcy of the West Shore Company, and a serious reduction in the net earnings, and, as a consequence, in the dividends of the New York Central and Hudson River Railroad Company. It is believed that, under one management, with an economical administration, upon the revival of business, the increased facilities which we can afford will enable the company to render an efficient and acceptable service to the public at such cost as to give a fair remuneration to the capital necessarily employed. It has been thought desirable, before completing this arrangement, to ask the stock holders to ratify the action of the directors by their votes at a meeting called for that purpose, to be held on the 4th day of November, 1885, at the office of the company in the city of Albany, at 12 o'clock noon. If you are in accord with the Directors and cannot attend in person, will you please send your proxy for that purpose to either of the undersigned at the Grand Central Station, New York? Cornelius Vanderbilt, Chairman of the Board of Directors; Chauncey M. Depew, President; Charles C. Clark, First Vice-President."

New York, Lake Erie & Western.—The company has been building three iron bridges on its branch from Buffalo to Suspension Bridge, one of 121 ft., one of 73 ft. span over the canal at Tonawanda, and one of 43 ft. span over Gill's Creek, near Niagara Falls.

New York, Ontario & Western.—It is reported that the company is about to order several new locomotives for fast passenger trains.

New York, Pennsylvania & Ohio.—The holders of the first-mortgage bonds of the Oil Creek Division, which have an overdue coupon, will apply for an injunction to prevent the payment of the interest on the consolidated bonds, which is advertised, until their own interest is paid.

Ohio & Mississippi.—The report for the year ending June 30 last, submitted at the annual meeting Oct. 8, shows, compared with previous years:

Year.	Gross earn.	Expenses.	Net earn.	Fixed charges.
1884–85	$3,641,467	$2,670,736	$974,731	$1,073,900
1883–84	4,135,436	3,283,401	856,036	.....
Decrease	$493,969	$612,665	.....	.....
Increase	.....	.....	$118,695	.....
1883	4,250,150	3,269,829	980,321	.....
1882	4,225,500	3,163,837	1,061,663	.....
1881	4,074,408	3,115,355	959,053	.....
1880	4,376,311	3,119,601	1,256,709	.....
1879	3,502,240	2,450,821	1,051,419	.....

Thus the gross earnings last year were the smallest since 1879, but the net earnings were larger than in 1883–84 or 1881. The net earnings lacked $99,168 of meeting the fixed charges last year. The decrease in the earnings is attributed to general depression in trade, the almost total failure of the wheat crop along the line for the past three years and to the low rates on freight.

Northern Pacific.—The extension of the Pacific end of the Cascade Division is nearly completed from South Prairie to Green River, the track being within 4 miles of Green River, which will be reached in November. There is much difficult work on the line. Green River is crossed seven times within 7 miles, on Howe truss bridges. It is reported that a branch 3 miles long will be built to the Black Diamond coal fields.

Ohio Valley.—Ground was broken Oct. 8 at Henderson, Ky., under a contract for constructing this road from Henderson southwestward to Jackson, Tenn., which requires 25 miles to be ready for the rails Dec. 31 and 15 miles more by May 1 next. It is reported that the rails and other track material have been bought. Capt. S. S. Brown and other Pittsburgh capitalists are said to have undertaken the enterprise. The contracts have been let to J. R. Terfele, Marshall Morris and T. H. McMichael, all of Louisville.

Philadelphia & Reading.—The negotiations concerning a plan of reorganization continue. It is reported that the general mortgage bonds will have their interest reduced from 6 to 4 per cent., and that there will be an assessment on the stock, which holders are expected to accept, because of the lower fixed charges. It is said that Mr. Vanderbilt approves this, and that he has 140,000 shares to pay assessments on. Counsel for the trustees of three of the mortgages are drafting a petition for foreclosure.

Rochester & Pittsburgh.—The time of the foreclosure sale was put off last Saturday till to-day (Oct. 16) because judgment had not been completed in Pennsylvania.

Sierra Valley & Mohawk.—This is the name of a railroad company which has recently filed articles of incorporation in California.

South Pennsylvania.—In the suit to enjoin the transfer of this road to the Pennsylvania, the testimony of Andrew Carnegie, a subscriber of $1,000,000 in the enterprise, who accepted the terms offered, of David Hostetter, a leading Pittsburgh promoter of the road, who opposed the sale, and of A. J. Drexel, of Morgan, Drexel & Co., of H. McKee Twombly, Mr. Vanderbilt's son-in-law, and of some others, was taken in Harrisburg last week, and last Tuesday Mr. J. Pierpont Morgan gave his evidence in New York, showing that he planned and largely conducted the negotiations for the transfer. Mr. Morgan received and holds the $5,600,000 Bedford & Bridgeport bonds guaranteed by the Pennsylvania Railroad Co. which are to be paid for the South Penn syndicate subscriptions.

Mr. F. Shunk, of Harrisburg, Associate Engineer of the American Construction Company and the South Pennsylvania Railroad, testified that "80 miles of the road are about five-eighths constructed," principally where the heavier work was required. It was intended to begin the construction of the lighter portion of the road at such a time as would enable the contractors to finish both the heavier and the lighter parts at about the same time. About 61 per cent. of the tunneling had been done. The piers and abutments for the large bridge across the Susquehanna are ready for the superstructure. Thence westward there has been no other construction until Burnt Cabins, Fulton County, is reached, except a mile section at each end of the tunnels. From Burnt Cabins to Sideling Hill tunnel, about 12 miles, all the work is about two-thirds done. In Bedford County seven miles are constructed, between Ray's Hill and Everett. Between New Baltimore and Donegal, 47½ miles, exclusive of tunneling, are about half done, except four miles, which have not been put under contract. The estimates of cost of graduation, masonry and bridges, revised to July 1, 1885, show that the total cost of the line, ready for the track, will be about $10,000,000. About 66 per cent. of the work is under contract, and about $3,442,000 worth of work was done up to July 1. The work done since then probably amounts to about 7 per cent. of the entire cost. The whole road could be completed from Harrisburg to Port Perry, about 209 miles, in one year from now.

Suburban Rapid Transit.—At the annual meeting last Monday, it was reported that the road is in working order as far as 134th street, New York city, and that it is expected to be completed to 144th street before winter, and that then trains will run regularly to connect with the Second avenue elevated trains at 129th street.

Texas Trunk.—At Dallas, Tex., Oct. 6, this road was sold by the United States Marshal to Jules Schneider for $6,000 to satisfy the judgment of the International Trust Co., of New York. There are 51 miles of the road from Dallas southeastward. It was sold under foreclosure of mortgage May 1, 1883. Last year its expenses exceeded its earnings by 12 per cent., and the latter were but $678 per mile.

Troy & Greenfield.—The Massachusetts Railroad Commissioners, who had been requested to do so by the Fitchburg Railroad Co., refuse to annul an order of Manager Locke, of the Troy & Greenfield Railroad; dated June 30 last, directing that east-bound trains shall no longer be switched into "station order" at North Adams yard. The decision of the Commissioners declares that the act of 1881, under the authority of which Manager Locke acted, is not unconstitutional, and that his action was without manifest injustice to any party and clearly within his legal power.

Verdigris Valley, Independence & Western.—A contract for the construction of the road to Yates City, Kan., was signed Oct. 3.

Vicksburg & Meridian.—The gauge is to be changed from 5 ft. to the standard 4 ft. 8½ in. Oct. 23. This is an intermediate section in the "Queen & Crescent Route" from Cincinnati to Shreveport, Tex., all of which now is of 5 ft. gauge from Cincinnati to Vicksburg. The Vicksburg & Shreveport line, however, was built of 4 ft. 8½ in. gauge, like the other roads west of the Mississippi, and recent changes have made the chief connections of the Vicksburg & Meridian west of Meridian of the same gauge.

Work is progressing on the inclines for the car transfer ferry at Vicksburg, and it is hoped to have it completed early in November.

Vicksburg, Shrevesport & Pacific.—The road-bed between the eastern terminus at Delta (opposite Vicksburg) and Rayville, 52 miles, being that part of the road in the Mississippi bottom land, has heretofore been under water when the river was very high. The work of raising has been progressing this season and is now nearly completed.

Wabash.—In an interview at St. Louis, Jay Gould is reported as saying that he will not be a director of the reorganized company, though he has a large interest in its stock and bonds; that Mr. Joy will be made President, in spite of his disinclination to take the place; and that Mr. Talmage will remain General Manager.

West Superior Terminal & Transfer Co.—This new company is engaged in constructing terminal track and yards and a union depot at West Superior, adjoining Duluth.